Medical Teacher, Vol. 20, No. 6, 1998

AMEE Medical Education Guide No. 13: real patients, simulated patients and simulators in clinical examinations

J. P. COLLINS[1] & R. M. HARDEN[2]
[1]Faculty of Medicine & Health Sciences, University of Auckland, New Zealand; & [2]Centre for Medical Education, University of Dundee, Dundee, UK

SUMMARY *In the assessment of clinical competence it is important to observe a candidate interacting with a patient. The role of the patient in this encounter will vary depending upon the level of interaction expected between the student and the patient, and whether physical signs are part of the presentation. Patients used in examinations may be real or simulated by a person who has undergone training in order to reproduce a particular scenario. Models or simulators, videotape and audiotape and computers may also be used as patient substitutes.*

There is a continuum between real patients with no training and simulated patients who have been extensively trained to perform the task:

(1) 'real' patients presenting in clinical practice;
(2) 'real' patients who have agreed to take part in a clinical examination but who are unrehearsed;
(3) 'real' patients who have been rehearsed in what is expected of them;
(4) 'real' patients who have been asked to modify, for the purpose of the examination, aspects of their history or presentation;
(5) 'real' patients whose medical experience forms the basis for their performance in the examination but whose presentation is substantially modified for the purpose of the examination;
(6) simulated patients who are given only an outline of what is expected of them;
(7) simulated patients who are given a short brief or scenario with which they become familiar but beyond which they are free to respond as they wish;
(8) simulated patients who are briefed extensively and who are thoroughly rehearsed prior to the examination.

Simple and sophisticated simulators may be used to assess skills of physical examination and practical procedures.

In only a few instances is the choice of patient representation in an examination limited to one approach. Examples where the choice is limited are the use of real patients with physical signs which cannot be simulated, the use of simulated patients in delicate or emotionally difficult areas, and the use of simulators where the use of patients would be inappropriate, for example, cardiopulmonary resuscitation. In many instances, however, there is no one correct approach. The approach adopted should be determined by the local circumstances and the needs of the examination.

Factors which should influence the choice of patient representation in an examination are related to:

(1) what is being assessed, including the level of abnormality and level of interaction with the patient required;
(2) the level of standardization required, with greater emphasis on standardization needed for high-stakes national examinations;
(3) the logistics, including the availability and costs of real patients and trained simulated patients;
(4) the context, for example, practice-based or formal examinations of the OSCE type;
(5) the level of realism or authenticity required.

Practical steps can be taken in the clinical examination to get the maximum value from the patient whether 'real' or simulated.

Examination of clinical competence

At a recent international meeting on medical education, a participant asked the question "Is it possible to use real patients in an Objective Structured Clinical Examination?". The question is a surprising one. Many centres use only real patients in the OSCE setting and some a mixture of both real and simulated patients. Indeed, the initial description of the OSCE (Harden *et al.*, 1975) and the subsequent ASME Medical Education booklet on the subject (Harden & Gleeson, 1979) both refer to the use of real

Correspondence: John P. Collins, Centre for Medical Education, Middlemore Hospital, Private Bag 93 311, Otahuhu, Auckland 6, New Zealand. Tele: +649 2704779; Fax: +649 276 0066; e-mail: jcollins@middlemore.co.nz

0142-159X/98/060508-14 $9.00 © 1998 Carfax Publishing Ltd

Medical Teacher, Vol. 21, No. 1, 1999

AMEE Guide No. 14: Outcome-based education: Part 1—An introduction to outcome-based education

R. M. HARDEN*, J. R. CROSBY & M. H. DAVIS
Centre for Medical Education, Tay Park House, Dundee, UK

SUMMARY *Outcome-based education, a performance-based approach at the cutting edge of curriculum development, offers a powerful and appealing way of reforming and managing medical education. The emphasis is on the product—what sort of doctor will be produced—rather than on the educational process. In outcome-based education the educational outcomes are clearly and unambiguously specified. These determine the curriculum content and its organisation, the teaching methods and strategies, the courses offered, the assessment process, the educational environment and the curriculum timetable. They also provide a framework for curriculum evaluation.*

A doctor is a unique combination of different kinds of abilities. A three-circle model can be used to present the learning outcomes in medical education, with the tasks to be performed by the doctor in the inner core, the approaches to the performance of the tasks in the middle area, and the growth of the individual and his or her role in the practice of medicine in the outer area.

Medical schools need to prepare young doctors to practise in an increasingly complex healthcare scene with changing patient and public expectations, and increasing demands from employing authorities. Outcome-based education offers many advantages as a way of achieving this. It emphasises relevance in the curriculum and accountability, and can provide a clear and unambiguous framework for curriculum planning which has an intuitive appeal. It encourages the teacher and the student to share responsibility for learning and it can guide student assessment and course evaluation.

What sort of outcomes should be covered in a curriculum, how should they be assessed and how should outcome-based education be implemented are issues that need to be addressed.

Outcomes and curriculum planning

> *A good archer is not known by his arrows but by his aim.*
>
> Thomas Fuller

> *A windmill is eternally at work to accomplish one end, although it shifts with every variation of the weathercock, and assumes ten different positions in a day.*
>
> Charles C. Colton

A key element in the conceptualisation and construction of a building is the architect's plan. This conveys an image in some detail of what the building will be like after it has been completed. It is accompanied usually by an artist's impression or even a three-dimensional model of the finished construction. The plans provide, for those who are commissioning the building and for the intended users, a clear unequivocal statement as to what they can expect when the building is completed. A judgement can then be made as to whether the final product matches what has been proposed and agreed. Building authorities can see whether the building corresponds to the building regulations. Neighbours can see whether the building will intrude on their privacy or space, and negotiations can take place with amendments to the plan where necessary. The plan of the completed building will influence, too, the materials required for use in its construction and the methods of construction adopted. It will provide a tool for overseeing progress in the construction of the building.

In the same way, there is a need for a clear and public statement of the learning outcomes for a medical education programme. What sort of doctors will the programme produce? What competencies will they possess? What basic skills, including personal transferable and communication skills, will the doctors have? Will the doctors be orientated to healthcare in the community as well as in the hospital? Will they have training in health promotion? Will they be competent to undertake research? Will they have a commitment to the ethical principles of medical practice? A statement of the learning outcomes for the programme will address these and other questions.

All medical schools have outcomes whether by design or not. That is, they produce doctors, but the nature of the product may be unspecified. Zitterkopf (1994) reminded us, however, that "the difference between being outcome-based and simply producing outcomes is significant. An outcome-based school produces results relating primarily to predetermined curriculum and instruction. The focus is on the achievement of results . . ." The results of medical training, according to national reports and studies of graduates from different medical schools, are newly qualified doctors who do not demonstrate some of the basic competencies expected of them (Walton, 1993). A common perception of current medical education is of inappropriate and insufficiently rigorous outcomes.

The concept of a curriculum traditionally included two elements—the content or what the students studied, and the examinations which were designed to assess the extent to which the students had learned the content. This concept expanded to include the learning methods and educational strategies adopted, and later to include the aims and objectives of the programme. Harden (1986) has described these key curriculum components in the context of medical education. It is now accepted that learning outcomes should occupy a key position in curriculum planning and a model for the curriculum which recognises this is given in

Correspondence: Professor R. M. Harden, Centre for Medical Education, Tay Park, House, 484 Perth Road, Dundee DD2 1LR, UK. Tel: +44 (0)1382 631972; Fax: +44 (0)1382 645748; e-mail: p.a.willis@dundee.ac.uk

0142-159X/99/010007-08 $9.00

Medical Teacher, Vol. 21, No. 1, 1999

AMEE guide No. 14: Outcome-based education: Part 2—Planning, implementing and evaluating a competency-based curriculum

STEPHEN R. SMITH & RICHARD DOLLASE
Brown University School of Medicine, RI, USA

SUMMARY *In September, 1996, Brown University School of Medicine inaugurated a new competency-based curriculum, known as* ***MD2000****, which defines a comprehensive set of competency requirements that all graduates are expected to attain. The medical students entering in 1996 and thereafter are required to demonstrate mastery in nine abilities as well as a comprehensive knowledge base as a requirement for graduation. Faculty use performance-based methods to determine if students have attained competence.*

We describe in this article the reasons why we developed the new curriculum, how we planned and structured it, and the significance we anticipate the curricular innovation will have on medical education.

Why it was developed

Several well-respected reports have criticized medical education over the last two decades. The General Professional Education of the Physician (GPEP) Report, published by the Association of American Medical Colleges (AAMC) in 1985, called on medical schools to give each student the knowledge, skills, values and attitudes that all physicians should have. The report sharply rebuked medical faculties for overloading the curriculum with factual information that students were expected to memorize. "By this concentration on the transmittal of factual information, faculties have neglected to help [students] acquire the skills, values, and attitudes that are the foundation of a helping profession" (Report of Project Panel on the General Professional Education of the Physician and College Preparation for Medicine, 1984)

A report funded by the Macy Foundation highlighted deficiencies in the clinical education of medical students, noting that faculty rarely observed students directly to assess their ability to obtain a history or perform a competent physical examination (Gastel & Rogers, 1989).

A 1992 report by the AAMC reiterated the recommendations of the GPEP report and examined the reasons why implementation has been so slow (Association of American Medical Colleges, 1992). Though all these reports seem to indicate a consensus among medical educators of what's wrong and what needs to be done, the lack of progress led one observer to describe the situation as one of 'reform without change' (Bloom, 1988).

Evaluation drives the curriculum

The leadership at Brown's medical school assert that 'evaluation drives the curriculum'. We believe that by clearly specifying the educational outcomes in behaviourally measurable ways, we can change the way faculty teach and students learn. Instead of solely determining whether students graduate based on the accumulation of course credits, graduation would be contingent upon demonstrating mastery of a defined set of competencies.

Research in other areas of education has shown that when the ways in which students are evaluated is altered, teaching and learning quickly change to match the new expectations. Ronald Harden, director of the Centre for Medical Education, University of Dundee, Scotland, tells of soldiers being trained to assemble guns in the field. Despite a well-presented curriculum in the classroom and good scores on their exams, the soldiers were not performing well in the field. A new teacher changed the way the student soldiers were tested. He cleared away all the desks and chairs and dumped disassembled guns on the floor. The soldiers were told that in order to pass the course, they needed to correctly assemble the guns. Soon all the students were on their hands and knees struggling with the equipment and the field manuals. The classroom instructors were on the floor with them, helping the soldiers use the manual to guide the field assembly. Thereafter, the soldiers went into the field adept at assembling their guns (Harden, 1986).

While educating physicians is not the same as training soldiers how to assemble guns, the principles are the same. Medical students are highly motivated learners. Medical faculty are dedicated teachers. When both faculty and students understand clearly what is expected, they will figure out a thoughtful way to get there.

By creating a competency-based curriculum, Brown medical school hopes to better assure that it is graduating physicians who possess the qualities and attributes desired in a competent physician. Further, the new curriculum is expected to foster a sense of shared mission between student and teacher, both striving to reach a common goal.

Such a curriculum engenders more active learning on the part of the students. Teachers are more highly engaged in helping students gauge their progress and in identifying and overcoming barriers to their achievement.

This developmental process of teaching and learning is most effective when the milestones and end points are known. When known, the teacher and student can work together toward those shared goals, recognizing growth, identifying barriers, and collaboratively devising strategies to overcome those barriers. The teacher can create a learning

Correspondence: Dr Stephen R. Smith, Brown University School of Medicine, Box G–A218, Providence, RI 02912, USA.

0142-159X/99/010015-08 $9.00

Medical Teacher, Vol. 21, No. 1, 1999

AMEE Guide No. 14: Outcome-based education: Part 3—Assessment in outcome-based education

MIRIAM FRIEDMAN BEN-DAVID
International Consultant in Medical Education, Jenkintown, PA 190 Y6, USA

SUMMARY *The role of performance assessment in outcome-based education is discussed emphasizing the relationship and interplay between these two related paradigms. Issues of the relevancy of assessment to student learning are highlighted in the context of outcome-based education. The importance of defining assessment premises and the role of institutions in defining their educational philosophy as it pertains to student learning and assessment is also presented. A brief description of implementation guidelines of assessment programs in outcome-based education are presented indicating the key features of such programs.*

Introduction

Higher education institutions have been responding to a growing concern for the adequacy of students' professional and career preparation by specifying the outcomes or abilities critical for future professional performance (Friedman & Mentkowski, 1980). Such outcome educational programs focus on assessing performance as well as knowledge as a key to bridging the gap between college and career.

Institutions of higher education who set pre-defined learning outcomes in behavioral objectives demonstrate advanced educational reform in teaching, learning and assessment. These programs demonstrate a unique approach to education by designing a comprehensive systemic (school wide) and systematic curricula which goes beyond knowing.

Outcome-based education and performance assessment are closely related paradigms. They are bound by simple educational principles: (1) assessment methods should match the learning modality; (2) in all fairness, students are entitled to learning experiences which will adequately represent the assessment methods. Consequently, outcome-based programs are faced with the need to develop non-traditional teaching and assessment techniques, which capture both the learning and performance of broad abilities. Recent developments in assessment methodology have focused on performance assessment, and somewhat neglected the related paradigm of outcome based education. Ideally, at the didactic phase of medical education, where the full scope of professional development is considered, the two are inseparable. In such programs, a comprehensive assessment will be integrated with all stages of the curriculum from its initial conception. Furthermore, assessment activities are integrated with learning to enhance student learning from their own assessment experience (Loacker, 1993). Medical schools have unique opportunities to observe students through their learning and assessment over a prolonged period of time. Students are eager to demonstrate their professional growth, and to monitor their own learning. Thus, clear outcome objectives, assessment-feedback and student self-assessment are central to outcome-based education.

The call for performance assessment by US national organizations is actually a call for outcome-based education. Proposals of the National Educational Goals Panel (1991) and the National Council on Educational Standards and Testing (1992), have both called for national examinations with performance assessment as a featured concept with an emphasis on testing complex 'higher order' knowledge and skills in the setting in which they are actually used (Swanson *et al.*, 1995). In order to respond to these proposals, 'higher order' knowledge and skills need to be defined and incorporated in the instructional design along with performance assessment methods. Abilities may be defined as short-term behaviors, which are prerequisite to the next stage of learning; as long-term behaviors linked to the work place; or both. However, common to all outcomes based curricula is the desire to demonstrate the credibility of the program in terms of what graduates know and can do.

The purpose of this paper is to highlight important concepts of assessment in outcome-based education along the following three topics:

(1) the interplay between assessment and outcome based programs;
(2) assessment premises in outcome-based education;
(3) implementation of assessment programs in outcome-based education.

The interplay between outcome-based education and assessment

The design of outcome-based education and student assessment must include consideration of expected student outcome as viewed by different consumer groups. These views reflect different needs and expectations. Examples of consumer perspectives are found in faculty expectations from students, future employers or licensure/certification bodies. Faculty may expect students to master the learning material, future employers may expect readiness to enter specialized programs and licensure/certification bodies may expect demonstration of general professional competencies. By whichever perspective the outcome objectives are defined, from an assessment perspective, the stakes are not similar. Thus, the school decision to satisfy the needs of one or more consumer groups will dictate the nature of the outcome objectives and the assessment program.

For example, Brown University School of Medicine (Smith & Fuller, 1994), have developed a competency-based curriculum which defines nine activities: effective

Correspondence: Dr Miriam Friedman Ben-David, 129 Woodpecker Road, Jenkintown, PA 190Y6, USA.

0142-159X/99/010023-03 $9.00 © 1999 Carfax Publishing Ltd

Medical Teacher, Vol. 21, No. 1, 1999

AMEE Guide No. 14: Outcome-based education: Part 4—Outcome-based learning and the electronic curriculum at Birmingham Medical School

NICK ROSS* & DAVID DAVIES
The School of Medicine, The University of Birmingham, UK

SUMMARY *Outcome-led curricula are increasingly relevant to medical education as Universities seek means to make explicit the criteria against which the success of both the course and the students should be judged. This paper outlines some of the main factors which led the University of Birmingham School of Medicine to develop an outcome-led curriculum for the new undergraduate medical course. Having set the general context, it then describes how the specific structure used by the school for organising integrative learning outcomes both influenced and was influenced by the parallel decision to develop an 'electronic curriculum' database. The advantages of the electronic curriculum database developed by the School are discussed and examples are given to demonstrate the flexibility with which information can be accessed by students, clinicians and other teachers.*

Although the term curriculum might most appropriately refer to the whole educational experience of the student (Lawton, 1973), it is more commonly used to refer to the course as planned. As Lowry (1993) points out, there may be a considerable difference between the curriculum as planned, the curriculum as implemented and the curriculum as experienced by the students. There are a number of reasons for this potential dissonance, including a general resistance to change, a failure to share 'ownership' of new curricular plans, and the reaction of the students.

A further pressure relates particularly to the clinical component of education and to the variation in the learning environments used to undertake a particular part of the course. The learning resource and opportunity offered by two different junior medical firms will not be precisely the same. Indeed, one medical firm is unlikely to be able to offer precisely the same experience on two different days. In the past, medical curricula have managed this disparity largely by avoiding it, through the use of an apprenticeship system in which responsibility for determining content rests with the supervisor (Lowry, 1993). They have simply stipulated that, for example, students will have a certain number of weeks of 'junior medicine' in the third year. Since the detail of the expected experience was not specified in the curriculum plan, the experience the students gained could not be dissonant. However, students were only too aware of the differences between their individual experiences and understandably concerned about how this might affect their assessment performance.

Despite this, the 'steady state' of medical education, in which consultants could, to a greater or lesser extent, rely on their own student experience as the basis for structuring the experience they offered to their students, meant that such a system could be maintained. When the intention is to radically revise the nature of medical education, a more directive strategy is required. With the publication of *Tomorrow's Doctors* (GMC, 1993), the General Medical Council set in motion just such a broad change process.

Whatever structure were to be imposed on clinical experience, some variation would be inevitable, since educational planning will always have to take second place to patient need. Both higher education and professional bodies (QAA, 1997; GMC, 1993) are challenging the tradition of unregulated apprenticeship and increasingly requiring schools of medicine to exercise tighter control over the curriculum as implemented and experienced: to offer a specification of intent against which the education of the student can be judged. In this climate, schools of medicine cannot continue to give individual clinical firms 'free rein', but it is up to them to determine how educational planning can regulate the serendipity of clinical learning without hobbling it.

If the main specification of education in the curriculum is in terms of input (taught sessions or particular learning events), conflict with available learning opportunities and resources in a particular environment will be inevitable. Where there is conflict, the learning resource is bound to be the ultimate determinant of experience. The danger is that relatively few 'unachievable' or 'impractical' proposals in the curriculum plan may lead to the whole being characterised by a clinical firm as 'not written with us in mind' and therefore irrelevant. In this context, even those proposals which might have worked within the pattern of available opportunity to enhance the educational experience may remain unimplemented. Even where plans are partially implemented, there is no framework within which the remaining differences in student experience can be resolved (see Figure 1).

Where the curriculum specifies education in terms of learning outcome, different clinical environments can be encouraged to use their strengths, identifying the most appropriate means through which *they* can enable students to achieve the required objective. Differences in student experience will remain, but the common endpoint specified in the learning outcomes constrains differences and provides a point of resolution. Furthermore, the explicit acceptance of diversity of experience/input within the planned curriculum means that it retains its relevance to the course as

Correspondence: Mr Nick Ross, The School of Medicine, The University of Birmingham, Edgbaston, Birmingham B15 2TT, UK. Tel: +121 414 3778. Fax: +121 414 6933. Email: n.m.ross@bham.ac.uk

0142-159X/99/010026-06 $9.00

Medical Teacher, Vol. 21, No. 6, 1999

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

R.M. HARDEN, J.R. CROSBY, M.H. DAVIS & M. FRIEDMAN
Centre for Medical Education, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK

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,

Correspondence: Professor R. M. Harden, Centre for Medical Education, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK. Tel: +44 (0)1382 631972; Fax: +44 (0)1382 645748; Email: p.a.wilkie@dundee.ac.uk

ISSN 0142-159X (Print) 1466-187X (Online)/99/060546-07

Medical Teacher, Vol. 21, No. 2, 1999

AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide

M.H. DAVIS & R.M. HARDEN

Centre for Medical Education, University of Dundee, Tay Park House, 484 Perth Road, Dundee DD2 1LR, Scotland

SUMMARY *This practical guide for health professions teachers provides a perspective of one of the most important educational developments in the past 30 years. Problem-based learning (PBL) is a continuum of approaches rather than one immutable process. It is a teaching method that can be included in the teacher's tool-kit along with other teaching methods rather than used as the sole educational strategy. PBL reverses the traditional approach to teaching and learning. It starts with individual examples or problem scenarios which stimulate student learning. In so doing, students arrive at general principles and concepts which they then generalize to other situations. PBL has many advantages. It facilitates the acquisition of generic competences, encourages a deep approach to learning and prepares students for the adult learning approach they need for a lifetime of learning in the health care professions. It is also fun. PBL helps in curriculum planning by defining core, ensuring relevance of content, integrating student learning and providing prototype cases. There are also drawbacks associated with PBL. Students may fail to develop an organized framework for their knowledge. The PBL process may inhibit good teachers sharing their enthusiasm for their topic with students and student identification with good teachers. Teachers may not have the skills to facilitate PBL. The problem scenario is of crucial significance. It should engage the students' interest and be skilfully written. While the medium selected for presentation of the scenario is usually print, other media may be used. The clinical tasks carried out by the student may replace the problem scenario as the focus for learning. Students are supported during the PBL process by tutors and/or study guides. The amount of support required is inversely related to the students' prior learning and understanding of the PBL process. A range of additional learning resources and opportunities may be made available to the students, including textbooks, videotapes, computer-based material, lectures and clinical sessions. Tutors require group facilitation skills, an understanding of the PBL process and knowledge of the course and of the curriculum in general. They need special personal qualities and it is preferable if they have expertise in the content area. While special assessment processes have been developed to assess students learning by the PBL method, the general principles of assessment apply to PBL courses and a mixed menu of assessment methods needs to be employed. Curriculum design involves a skilful blend of educational strategies designed to help students achieve the curriculum outcomes. PBL may make a valuable contribution to this blend but attention needs to be paid to how it is implemented.*

Introduction

PBL is one of the most important developments in health professions education in the latter part of the twentieth century. "Some argue" suggested Boud & Feletti (1991) "that it is the most important development since the move of professional training into educational institutions". Since it was first developed by Howard Barrows at McMaster (Barrows & Tamblyn 1976), new medical schools throughout the world have adopted PBL as the educational and philosophical basis of their curricula and traditional schools have included it within their portfolio of teaching methods or have converted their undergraduate programmes to PBL.

In the UK the General Medical Council (GMC) has advocated a problem-oriented approach in its recommendations for basic medical education (GMC 1993). "Medical schools are well aware of the merits of the learner-centred and problem-orientated approaches and are striving towards their adoption, moves which are strongly encouraged."

However, PBL is also a matter of some controversy. Is it a significant development or a passing fad? Is PBL appropriate only in new medical schools or has it relevance in traditional schools? Indeed, what is PBL? Can PBL be introduced in any part of the curriculum?

One difficulty in discussions about PBL is that there is a great deal of confusion about what is meant by the term. Indeed, the term is often misused and misapplied in practice. There is also doubt or lack of clarity about the educational underpinnings of PBL. The role of the teacher in PBL is very different from the role of the teacher in the traditional curriculum and this role change may seem threatening to some teachers in the health professions. It is often thought that PBL is difficult to organize and expensive to implement in terms of time and resources.

The aim of this booklet is not to produce a critical review of the research evidence for and against PBL and its role in the undergraduate medical curriculum. A number of reviews have been published with this as their objective (Albanese & Mitchell, 1993; Vernon & Blake, 1993). Rather it is presented as a practical guide on PBL for teachers in the healthcare professions. It provides the educational background necessary for teachers to understand the approach and hints on the application of PBL to the reader's own course or curriculum.

The questions for individual teachers is not whether to implement a PBL curriculum or not, but rather the extent to which they should introduce PBL into their own teaching (Harden *et al.*, 1984). Where should their course be on the continuum between problem-based at one end of the spectrum and an information-gathering approach at the other?

0142-159X/99/020130-11 $9.00

Medical Teacher, Vol. 18, No. 1, 1996

AMEE Medical Education Guide No. 7. Task-based learning: an educational strategy for undergraduate, postgraduate and continuing medical education, Part 1

R. M. HARDEN, JENNIFER M. LAIDLAW, JEAN S. KER & HELEN E. MITCHELL
Centre for Medical Education, University of Dundee, Scotland, UK

SUMMARY *Task-based learning (TBL) is an educationally sound, effective and efficient strategy for delivering relevant education. In TBL, the tasks of the healthcare professional provide the context and the focus for learning—but are not the objective of the student's learning. Students gain a basic understanding of the principles of health and disease, and of how to apply these in a range of contexts. Within the specific context of healthcare, students develop generic competences, such as communication and management skills. TBL ensures that learning objectives are achieved, while taking advantage of the rich opportunities and experiences to which a student or doctor can be exposed in a real or simulated clinical setting*

Educational strategies in medical education

Harden (1986) has described 10 issues that should be addressed when a medical course or curriculum is planned. Of these, educational strategies have attracted much attention and controversy in recent years. The SPICES model describes six strategies, shown in bold type in the text below: each can be seen as a continuum between two extremes (Harden *et al.*, 1984).

An increased orientation to the consumer of the education has been reflected in a move of focus from teacher or trainer to student or trainee. In *student-centred learning*, success is judged by what the students or trainees learn, rather than what they are taught. The move, from an emphasis on the acquisition of knowledge for its own sake, to the application of knowledge and the development of higher learning objectives, including problem-solving skills, has been reflected in *problem-based learning*. *Integrated teaching* can be seen as a response to the problems associated with increasing specialization in medicine and the need for the doctor to have a view of the patient as a whole. The trend towards *community-based education* recognized the importance of healthcare delivery in the community as well as in the hospital setting, and reflected the improved status of general practice. The rapid growth of knowledge the so-called "information explosion"—fuelled a concern that students were learning less and less about more and more. A reaction to this has been a move towards a core curriculum with options or *electives*, where students can tackle a range of subjects in more depth (General Medical Council, 1993; Harden & Davis, 1995).

Demands from the profession, and the public, for more accountability and a more *systematic* and managed approach to doctors' learning, rather than the haphazard apprenticeship model, have led to curricular changes: students and trainees are now introduced more *systematically* to the skills and competences required of them on completion of their training.

This AMEE medical education guide describes a seventh educational strategy. Task-based learning (TBL) was first described by Harden (Harry, 1989) at a meeting of the Association for the Study of Medical Education in Bristol in September 1988. The concept of TBL can make learning more related to the work of the healthcare professional. TBL addresses the increasingly important question of

Correspondence: Professor R. M. Harden, Centre for Medical Education, University of Dundee, Tay Park House, 484 Perth Road, Dundee DD2 1LR, Scotland, UK.

Medical Teacher, Vol. 18, No. 3, 1996

AMEE Medical Education Guide No. 8. Learning in small groups

JOY CROSBY
Ninewells Hospital and Medical School, Dundee, UK

SUMMARY *There is a recent trend towards small-group work in undergraduate medical courses. Current understanding of educational strategies supports the use of small groups as an effective method of learning. Small group work recognizes a movement towards learner-centred, problem-based and self-directed learning. The exploration of knowledge, learning through curiosity, the critical examination of evidence and a capacity for self-education are all fostered in small-group interactions. This article explores the rational arguments that support the movement towards small-group learning, the many types of small-group activities and the many types of small-group methods. Small groups interact in a variety of ways and the teacher has an important role. Barriers, more often perceived than real, may impede the adoption of small-group teaching. Practical guidance is offered on why to adopt small-group work and how to do it effectively. The teacher is provided with a framework for running small-group sessions and is given three simple checklists to consider before, during and after the small-group activity.*

What is small-group learning?

The term small-group learning can be misleading, as 'small' implies no definite number. The literature is equivocal on the number of students that constitutes an effective small group. Small-group teaching depends more on the features displayed by that group than on the number in it. Usually, but not always, meaningful interaction occurs more readily with fewer people. You may have your own preference. To you, effective groups may have less than 10 participants. However, some groups may work effectively with a larger number of participants, some may be ineffective with a smaller number. What matters is that the group shows three characteristics: active participation, work towards a specific task and reflection.

Active participation

The most important feature of small-group work is that interaction should take place among *all* present. Levels of participation may vary among members. It is important that there is some participation by all members.

A significant aspect of group work is the response of participants to other members in the group. Responses may occur in a number of ways. If face-to-face, effective discussion depends on interaction, this is much easier to achieve around a small table or in an open circle rather than with the students sitting in rows or around long tables. Ensure that members of a group can see each other, to pick up visual and verbal cues from one another.

Group work can also be achieved through teleconference or telephone. If the link is sound only, visual cues become insignificant. Reliance is placed on audio response and interaction.

A specific task

The group must have a clearly defined task. Group work should be focused. Unclear objectives can cause frustration—for the teacher (Tiberius, 1990) as well as the students. If students are confused about the objectives, the class may appear unresponsive. The task and objectives should be clearly understood by all members of the group, allowing them to focus on that task.

Reflection

In small-group learning, it is important to learn from an experience and to modify behaviour accordingly. Deep learning is a key feature of small-group work; reflection is a key feature of deep learning. Reflection may be explicitly scheduled into a session. Alternatively, a session may be dedicated to the reflection process. The importance of reflection was highlighted by Kolb (1984) in his experiential learning cycle. Reflection is generally considered an important aspect of turning experiences into learning (Boud *et al.*, 1985).

These three characteristics of small-group work may be more obviously displayed in groups that are small in numbers. However, a skilled facilitator may be able to engender some of these qualities in larger groups.

Correspondence: Joy Crosby, Curriculum Development, University of Dundee, Ninewells Hospital and Medical School, Dundee DD1 9SY, UK. Email: J.R.Crosby@Dundee.ac.uk

0142-159X/96/030189-14 © 1996 Journals Oxford Ltd

Medical Teacher, Vol. 19, No. 1, 1997

AMEE Medical Education Guide No. 9. Assessment of clinical competence using the Objective Structured Long Examination Record (OSLER)

FERGUS GLEESON
James Connolly Memorial Hospital & The Royal College of Surgeons in Ireland, Dublin, Ireland

SUMMARY *Much criticism has been directed at the assessment of clinical competence and at the long case in particular in recent years. In the traditional long case candidates spend one hour with a patient from whom they take a history and whom they examine. An examiner is not present. The student is then examined by a pair of examiners over a 20–30 minute period. This has been to the extent that the problems associated with the long case in terms of objectivity, validity and reliability are such that some critics have suggested that it should be abandoned altogether. Others would take the view that before we dispense with this method we should attempt to remodel and improve it. Furthermore, tradition and practicality would suggest that the long case will be with us for some time to come. The justifiable criticism of the long case is directed on a number of fronts, a major one being that the history-taking process is not observed by the examiners. Bearing these criticisms in mind, the Objective Structured Long Examination Record (OSLER) has been developed. The OSLER is a 10-item analytical record of the traditional long case which attempts as far as is possible within the limits of practicality to improve the objectivity, validity and reliability of existing practices. All candidates are assessed over 20–30 minutes by the examiners on the same 10 items, thus improving reliability and items are included that are representative of what would be regarded as having an acceptable degree of construct or face validity with regard to the long case. Attention is paid to communication skills and the history-taking process in particular. In attempting to standardize the long case and minimize the 'luck of the draw' aspect, examiners are requested to formally document the difficulty of the case. The figure of 10 with regard to the number of items assessed is not coincidental and is a deliberate act to include a minimum of the essential in terms of what should be assessed. This allows examiners to concentrate on the candidate's performance with a structured guide that is not so intrusive as to interrupt the examiner's concentration. The four items on history include pace and clarity of presentation, communication skills process, systematic approach and establishment of the case facts. Three items on physical examination include systematic approach, examination technique and establishment of the correct physical findings. During these activities the candidate's affective behaviour is also assessed. The remaining three items include construction of appropriate investigations in a logical sequence, appropriate management and final clinical acumen. The latter item draws on the previous nine to assess candidates' ability to identify and solve problems. The initial assessment is essentially criterion referenced through a P +, P, P − system which is followed by the selection of an appropriate mark, each of which has its own written descriptive profile. The perfect method for long case clinical assessment has yet to be established. Indeed perfection may be no more than a pious hope bearing in mind that any method will always be a compromise between objectivity, validity and reliability on one hand and practicality on the other. While the search for the perfect long case method continues, the OSLER is suggested as a practical approach to what is universally recognized as an ongoing assessment challenge.*

Introduction

Assessment is treated with great reverence in the vast majority of medical schools. Lowry (1993), however, has recently posed the question. Is assessment as powerful as we think, and if it is, are most medical educators using it

Correspondence: Fergus Gleeson, FRCPI, Associate Professor of Medicine, James Connolly Memorial Hospital, Dublin, Ireland. Tel: 8206700.

0142-159X/97/010000-00 © 1997 Journals Oxford Ltd

Medical Teacher, Vol. 19, No. 4, 1997

AMEE Medical Education Guide No. 10: managing change in a medical context: guidelines for action

RODNEY GALE & JANET GRANT
Joint Centre for Education in Medicine, London, UK

Introduction

These guidelines have been produced to make the essence of current good practice in change management available to everyone involved in changing medicine, particularly medical education at undergraduate, postgraduate and continuing levels. For most people, time is very precious and in very short supply, and it needs to be used sparingly, economically and to good effect. Most of us also have a finite quantity of enthusiasm and energy which is all too easily frustrated by fruitless or unsatisfactory attempts at change. Many good and valuable ideas are not coming through because the available human time and energy are not being applied in the most efficient way. These guidelines can help you to use your time more effectively and to achieve more lasting and more satisfying changes with the time and energy you have available.

Medical education at postgraduate and continuing level has always lacked recognition and has always taken place in borrowed time. Even now, there is very little money specifically to purchase education: Hospital Trusts provide the resources. Medical education has relied on enthusiasm, professionalism and dedication on the part of teachers and learners in order to survive in its present form. Service pressures are growing and more and more time is being squeezed out of the system. It is all the more important to use the scarce time and resources to good effect.

Our interest in the management of change in medicine arose because we had seen so many good initiatives allowed to wither on the vine for lack of a decent strategy to see them into place, so many good ideas wasted because of the way they were presented and so many changes made harder through failure to create a climate of cooperation. These guidelines can help all those involved in change, or contemplating change, to be aware of the consequences of particular approaches and to choose the best route to follow for their own circumstances.

Our guidelines are firmly rooted in medical practice and apply to issues over a very wide range indeed, much beyond educational matters to organizational and operational issues too. They have been thoroughly tested in practice and found to work in a broad range of contexts. We do not prescribe what to change, we are concerned with how to go about change and we give plenty of hints and tips to make that process more effective. We provide a framework in which to think about the change being contemplated and raise the issues that should be considered.

We are not offering a blueprint or 'change in easy stages'. You might prefer to see our work as a road map which gives many starting and ending points and many routes between them. Others may think of our model of change as a checklist from which a change strategy arises by elimination. Whatever way they are described, we trust you will find the guidelines an asset in your work.

The Leverhulme project

The basic data for this booklet were gleaned from a major research project supported by the Leverhulme Trust (Gale & Grant, 1990).

The project was designed to take what was known about the management of change in industry and in education and to adapt that knowledge to the medical context. To give detailed advice about the management of change, it is essential to know and understand the context in which the change will take place. It is very little use to ask a manager of industry for advice about change in medicine, except in the most general of terms. The nature of the enterprise, the distribution of power and influence, the degree of external political control and the outlooks of the professionals involved will all interact to limit the styles and types of change that are possible. Advice must be firmly anchored in the context of medicine and must take account of its special nature.

We started our research with a hypothetical framework,

Correspondence: The Joint Centre for Education in Medicine is an independent research and evaluation organization that specializes in all aspects of postgraduate and continuing medical education and its effective management and delivery.

Rodney Gale, The Joint Centre for Education in Medicine, 33 Millman Street, London WC1N 3EJ, UK. Tel: 1-44-(0)171-692 3145. Email: joanrc@gmdx.ac.uk

0142-159X/97/040239-11 Published by Carfax Publishing Ltd

Medical Teacher, Vol. 21, No. 4, 1999

AMEE Medical Education Guide No. 11 (revised): Portfolio-based learning and assessment in medical education

MAGGIE CHALLIS
Queens Medical Centre, University of Nottingham, UK

SUMMARY *Portfolios are not new, but their use in initial and continuing professional development in medicine is still in its infancy. In this context, this guide has the following aims: to give the background and an educational rationale for portfolio-based learning and assessment in medical education; to examine how and where portfolios have been used for professional development both within and beyond medicine; to highlight issues which will need to be addressed by those wishing to implement portfolio-based learning, and suggest ways of dealing with them. It does not attempt to address the particular constraints or resource issues that face practitioners in any educational initiative, as these are far too many and too complex for a publication of this type. However, it does provide evidence of a range of ways in which opportunities have been created and developed by colleagues in establishing frameworks within which individual learning can be planned, documented and assessed. Whilst not a panacea for all learning contexts, portfolios have much to offer both learners and teachers as we move forward into the new world of revalidation, clinical governance, and increased accountability.*

Rationale and development of portfolios

What is a portfolio?

"A professional development portfolio is a collection of material, made by a professional, that records, and reflects on, key events and processes in that professional's career" (Hall, 1992, p. 81). It is usually paper based, but it may also include anything that provides appropriate evidence of learning and achievement, such as video or audio recordings, artefacts or photographs. This evidence is gathered together, and possibly presented to another person for review, with a particular purpose in mind. Because the range of purposes is very large, there is an equally large range of structures and complexity of portfolio in use across professions, and even within medical education. Thus some will be little more than a log book recording specific activities, while others offer an in-depth and long-term perspective on professional development over an extended period.

Whatever the guiding purpose behind the portfolio, it should be clear to both the learner and the person making judgements about the portfolio. Some portfolios may be developed in order to demonstrate the process of progression, while others will be assessed against specific targets of achievement. Some will be essentially private documents, for personal review only, while others will need to be open to public scrutiny. It may therefore be appropriate for some learners to create a long-term, personal development portfolio, which shows breadth of learning. From this, items can be selected to demonstrate learning that meets the standards of achievement required by other authorities.

Portfolios will normally be integrally related to a personal or professional learning plan. This constitutes the framework within which portfolio development takes place, and provides a statement of the outcomes that the portfolio seeks to demonstrate.

In all cases, the portfolio remains the practical and intellectual property of the person who develops it. In order to maximize the learning potential of portfolio development, the learner therefore has to take responsibility for its creation, maintenance and appropriateness for purpose.

There are many benefits that arise from the use of portfolio-based learning that may not be encompassed in other forms of educational activity:

- it recognizes and encourages the autonomous and reflective learning that is an integral part of professional education and development;
- it is based in the real experience of the learner, and so enables the consolidation of the connection between theory and practice;
- it allows a range of learning styles to be used according to the preferences of the learner;
- it enables assessment within a framework of transparent and declared criteria and learning objectives;
- it can accommodate evidence of learning from a range of different contexts;
- it provides a process for both formative and summative assessment, based on either personally derived or externally governed learning objectives;
- it provides a model for lifelong learning and continuing professional development.

The remainder of this guide will explore these points, giving examples of how and where portfolio-based learning has been used in both medicine and other professions, and locating the practice within a model of adult learning and cognitive development.

Where did portfolios come from?

Keeping a portfolio of one's work is nothing new: architects, artists and writers have been doing it for years. Such portfolios are generally maintained in order to demonstrate

Correspondence: Maggie Challis, Senior Lecturer in Medical Education, Centre for Postgraduate and Continuing Medical Education, University of Nottingham, Queens Medical Centre, Nottingham NG7 2UH, UK. Tel: 0115 9194418; email: Maggie.Challis@nottingham.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/99/040370-17 © 1999 Taylor & Francis Ltd

Medical Teacher, Vol. 20, No. 5, 1998

AMEE Guide No. 12: Multiprofessional education: Part 2—promoting cohesive practice in health care

ANNE PIRRIE, VALERIE WILSON, R.M. HARDEN & JOHN ELSEGOOD
University of Edinburgh, UK

SUMMARY *The recommendations contained in this guide are derived from a two-year qualitative study of perceptions of multidisciplinary education in health care, funded by the Department of Health. The study was conducted by a multidisciplinary team at the Scottish Council for Research in Education (SCRE), the School of Health at the University of East Anglia, and the Centre for Medical Education at the University of Dundee. Interviews were conducted with course organizers and students, and with health professionals in two contrasting clinical settings: general medical practice and accident and emergency medicine. The evidence suggests that multidisciplinary education is neither an easy, nor a cheap option. It needs to be adequately resourced; the rationale for its development needs to be made explicit to both staff and students; and clear and achievable objectives need to be set for each stage. It requires careful planning throughout, and there should be adequate reflection upon the relative advantages and disadvantages of its inclusion at pre- and post-registration levels respectively. Finally, its success will ultimately depend upon the support and commitment of all staff involved.*

Introduction

In March 1996, the Scottish Council for Research in Education (SCRE) was commissioned by the Department of Health to undertake a two-year evaluation of perceptions of multidisciplinary education in health care. The study was undertaken in association with the School of Health (Nursing and Midwifery) at the University of East Anglia and the Centre for Medical Education at the University of Dundee. The project had three broad objectives, namely:

- to ascertain the extent of multidisciplinary provision throughout the UK (Phase 1);
- to investigate perceptions of multidisciplinary education at both undergraduate/pre-registration and postgraduate/post-registration levels (Phase 2);
- to identify factors which either facilitated or inhibited its development (Phase 2).

The guidelines below are derived from data gathered during Phase 2 of the project. Unlike many previous evaluations, which have focused on single initiatives based in individual institutions (for example, Jones, 1986; Leathard, 1992; Carpenter, 1995; MacLeod & Nash, 1994; Bisits & Haertsch, 1994; Forman *et al.*, 1994; Hilton *et al.*, 1995; Greene *et al.*, 1996; Pryce & Reeves, 1997), Phase 2 of the current study comprised 42 individual interviews, five focus groups with course organizers, and 10 with students in 10 HE-based sites throughout the UK. The sites chosen included four courses at pre-registration level and six at post-registration level.

To complement the data gathered from education providers and students, we also gathered information in four work-based sites: two accident and emergency (A&E) units, and two general medical practices, in which we conducted 19 individual interviews with a range of health care professionals; and one focus group discussion with a group of nurses who had attended an Advanced Trauma Nursing Course (ATNC). The rationale for the inclusion of these sites was to illustrate that learning to work together effectively is an iterative process which is not confined to formal learning opportunities.

In addition, we sought the views of a sample of six purchasers and commissioners—those responsible for education and training in NHS Executives, and in the local consortia, since as of April 1998 these have formally assumed some of the responsibilities for education and training.

The guidelines below stem from our analysis of the qualitative data. Our findings relating to the survey of provision have been reported elsewhere (Pirrie *et al.*, 1997; Pirrie *et al.*, 1998).

Correspondence: Dr Anne Pirrie, Research Fellow, University of Edinburgh, Faculty of Education at Moray House Institute, Holyrood Road, Edinburgh EH8 8NQ, UK. Tel: (0131) 558 6376. Fax: (0131) 558 6978. Email: Anne.Pirrie@ mhie.ac.uk

0142-159X/98/050409-08 $9.00

Medical Teacher, Vol. 20, No. 5, 1998

AMEE guide No. 12: Multiprofessional education: Part 1—effective multiprofessional education: a three-dimensional perspective

R. M. HARDEN
Centre for Medical Education, University of Dundee, UK

SUMMARY *The question with multiprofessional education is not whether it is effective or not. Rather it is in what circumstances can this important educational strategy be made effective? Multiprofessional education can be viewed as a three-dimensional model. The extent to which the approach to multiprofessional education adopted matches the context for the learning and the curriculum goals provides an indication of the success of developments in this area. Approaches to multiprofessional education can be described as 11 steps in a continuum with uniprofessional education at one end of the spectrum and transprofessional education at the other. The three-dimensional model offers a tool which can facilitate the planning and implementation of multiprofessional education. It is useful also for analysing and evaluating case studies in the field of multiprofessional education.*

Is multiprofessional education effective?

The multiprofessional healthcare team and multiprofessional education are very much on today's agenda. But so also are cancer, drug abuse and environmental pollution. This is not to suggest that multiprofessional education is proliferating uncontrollably like a cancer, that it is damaging to those engaged in it like drug abuse, or that it is a potential hazard to the learning environment in the same way as nuclear energy is to the living environment. There are, however, undoubted sceptics who have legitimate concerns about multiprofessional education and who feel that time and effort invested in this approach to education could be used more profitably for other purposes. Other workers in the field are less certain and have passed the Scottish verdict of 'not proven', perhaps filing the concept in a drawer labelled 'an interesting idea to keep pending further developments'. A number of healthcare professionals, however, have pursued multiprofessional education energetically and enthusiastically.

What, then, is the truth? Does multiprofessional education offer an effective learning strategy? The answer is yes and no. Yes if it is used appropriately, no if it is used inappropriately. The important question that follows is: what is the appropriate use of multiprofessional education? To answer this question, one has to take a three-dimensional perspective (Figure 1). The three dimensions are:

(1) the context in which the multiprofessional education is to be applied. This includes the phase or stage of education, the category of students, and the learning situation or educational format;
(2) the curriculum goals. These are the expected outcomes of the training programme;
(3) the approach to multiprofessional education adopted. Multiprofessional education is not one entity, but a continuum with a number of clearly identifiable steps or stages.

The appropriate use of multiprofessional education requires the matching of the approach to multiprofessional education adopted with the curriculum goals and with the context of the learning.

This paper looks in turn at each of the three dimensions—context, goals and approach to multiprofessional education. It offers an insight into multiprofessional education through a description of 11 stages in the continuum between uniprofessional education at one extreme, and transprofessional education at the other.

The context for multiprofessional education

The challenge presented by multiprofessional education

Correspondence: Professor R. M. Harden, Centre for Medical Education, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK.

0142-159X/98/050402-07 $9.00

Medical Teacher, Vol. 20, No. 6, 1998

AMEE Medical Education Guide No. 13: real patients, simulated patients and simulators in clinical examinations

J. P. COLLINS[1] & R. M. HARDEN[2]
[1]Faculty of Medicine & Health Sciences, University of Auckland, New Zealand; & [2]Centre for Medical Education, University of Dundee, Dundee, UK

SUMMARY *In the assessment of clinical competence it is important to observe a candidate interacting with a patient. The role of the patient in this encounter will vary depending upon the level of interaction expected between the student and the patient, and whether physical signs are part of the presentation. Patients used in examinations may be real or simulated by a person who has undergone training in order to reproduce a particular scenario. Models or simulators, videotape and audiotape and computers may also be used as patient substitutes.*

There is a continuum between real patients with no training and simulated patients who have been extensively trained to perform the task:

(1) 'real' patients presenting in clinical practice;
(2) 'real' patients who have agreed to take part in a clinical examination but who are unrehearsed;
(3) 'real' patients who have been rehearsed in what is expected of them;
(4) 'real' patients who have been asked to modify, for the purpose of the examination, aspects of their history or presentation;
(5) 'real' patients whose medical experience forms the basis for their performance in the examination but whose presentation is substantially modified for the purpose of the examination;
(6) simulated patients who are given only an outline of what is expected of them;
(7) simulated patients who are given a short brief or scenario with which they become familiar but beyond which they are free to respond as they wish;
(8) simulated patients who are briefed extensively and who are thoroughly rehearsed prior to the examination.

Simple and sophisticated simulators may be used to assess skills of physical examination and practical procedures.

In only a few instances is the choice of patient representation in an examination limited to one approach. Examples where the choice is limited are the use of real patients with physical signs which cannot be simulated, the use of simulated patients in delicate or emotionally difficult areas, and the use of simulators where the use of patients would be inappropriate, for example, cardiopulmonary resuscitation. In many instances, however, there is no one correct approach. The approach adopted should be determined by the local circumstances and the needs of the examination.

Factors which should influence the choice of patient representation in an examination are related to:

(1) what is being assessed, including the level of abnormality and level of interaction with the patient required;
(2) the level of standardization required, with greater emphasis on standardization needed for high-stakes national examinations;
(3) the logistics, including the availability and costs of real patients and trained simulated patients;
(4) the context, for example, practice-based or formal examinations of the OSCE type;
(5) the level of realism or authenticity required.

Practical steps can be taken in the clinical examination to get the maximum value from the patient whether 'real' or simulated.

Examination of clinical competence

At a recent international meeting on medical education, a participant asked the question "Is it possible to use real patients in an Objective Structured Clinical Examination?". The question is a surprising one. Many centres use only real patients in the OSCE setting and some a mixture of both real and simulated patients. Indeed, the initial description of the OSCE (Harden *et al.*, 1975) and the subsequent ASME Medical Education booklet on the subject (Harden & Gleeson, 1979) both refer to the use of real

Correspondence: John P. Collins, Centre for Medical Education, Middlemore Hospital, Private Bag 93 311, Otahuhu, Auckland 6, New Zealand. Tele: +649 2704779; Fax: +649 276 0066; e-mail: jcollins@middlemore.co.nz

0142-159X/98/060508-14 $9.00 © 1998 Carfax Publishing Ltd

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Student Selected Components (SSCs): AMEE Guide No 46

Simon C. Riley *
* College of Medicine and Veterinary Medicine, University of Edinburgh, Edinburgh, UK

Online Publication Date: 01 October 2009

To cite this Article Riley, Simon C.(2009)'Student Selected Components (SSCs): AMEE Guide No 46',Medical Teacher,31:10,885 — 894
To link to this Article: DOI: 10.3109/01421590903261096
URL: http://dx.doi.org/10.3109/01421590903261096

2009; 31: 969–983 MEDICAL TEACHER

AMEE GUIDE

Using rural and remote settings in the undergraduate medical curriculum: AMEE Guide No. 47

MOIRA MALEY[1], PAUL WORLEY[2] & JOHN DENT[3]

[1]The University of Western Australia, Western Australia, [2]Flinders University, South Australia, [3]University of Dundee, UK

Abstract

The goal of global equity in health care requires that the training of health-care professionals be better tuned to meet the needs of the communities they serve. In fact medical education is being driven into isolated communities by factors including workforce undersupply, education pedagogy, medical practice and research needs.

Rural and remote medical education (RRME) happens in rural hospitals and rural general practices, singly or in combination, generally for periods of 4 to 40 weeks. An effective RRME programme matches the context of the local health service and community. Its implementation reflects the local capacity for providing learning opportunities, facilitates collaboration of all participants and capitalises on local creativity in teaching. Implementation barriers stem from change management, professional culture and resource allocation. Blending learning approaches as much as technology and local culture allow is central to achieving student learning outcomes and professional development of local medical teachers.

RRME harnesses the rich learning environment of communities such that students rapidly achieve competence and confidence in a primary care/generalist setting. Longer programmes with an integrated (generalist) approach based in the immersion learning paradigm appear successful in returning graduates to rural practice and a career track with a quality lifestyle.

Introduction

Recent years have seen a growth of interest in developing the role of undergraduate medical teaching sites in rural or remote settings. There is both a need to provide clinicians to practice in non-urban areas and a need to spread medical education to locations away from urban-based teaching hospitals. This AMEE guide looks at the background to these developments and reviews the range of opportunities they can provide.

As the world-wide demand for health care increases, so too does the need to train health-care providers and to distribute them where needed (Price 2008). Some populations are, for whatever reason, remote from healthcare support, so there is a further requirement to train the providers appropriately to practice in these areas of need. Although similar rural health-care issues are present in various countries, so far North America and Australia have described more experiences with addressing these needs than Africa or Europe (Hays 2007a).

In an overview of the world's medical schools, Boulet et al. (2007) described the regional balance of medical schools, physicians and populations. Issues highlighted were physician migration, the relationship between physician output and population mortality/morbidity, the cost and quality of training programmes, but all were qualified by limitations of the source databases and audit practices.

Practice points

- Healthcare professionals should be trained to meet the needs of the communities they are to serve
- The need for medical education in rural areas is driven by:
  - medical workforce undersupply and misdistribution
  - changes in medical practice
  - changes in medical education
  - need for medical research relevant to rural practice
- Rural practice contexts suitable for training include:
  - rural hospitals
  - rural general practices
  - 'community immersion' utilising both local hospital and primary care agencies (integrated placement)
- In planning an RRME programme consider the:
  - location
  - duration of programme
  - number of students required
  - learning resources available
  - style of learning
  - provision of staff and student support
  - available finances
- Remote and rural communities provide a rich learning environment in which students can rapidly acquire competences and confidence in primary care in a generalist setting

Correspondence: Moira Maley, The Rural Clinical School of Western Australia (RCSWA) (Albany), School of Primary, Aboriginal and Rural Health Care, Faculty of Medicine, Dentistry & Health Sciences, The University of Western Australia, 48 Frederick St, Albany, Western Australia 6330, Australia. Tel: 618 9842 5555; fax: 618 9842 5444; email: moira.maley@uwa.edu.au

ISSN 0142–159X print/ISSN 1466–187X online/09/110969–15 © 2009 Informa Healthcare Ltd.
DOI: 10.3109/01421590903311234

2010; 32: 715–726 MEDICAL TEACHER

AMEE GUIDE

Effective small group learning: AMEE Guide No. 48

SARAH EDMUNDS[1] & GEORGE BROWN[2]
[1]University of Westminster, UK, [2]University of Nottingham, UK

Abstract

The objective of this educational guide is to outline the major facets of effective small group learning, particularly applied to medicine. These are discussion skills, methods, the roles and responsibilities of tutors and students, the dynamics of groups and the effects of individuals. It is argued that the bases of effective small group learning are discussion skills such as listening, questioning and responding. These skills are the platform for the methods of facilitating discussion and thinking. The facilitating methods strengthen the generic methods, such as tutorials, seminars and electronic tutorials. However, the success of these methods is dependent in part upon the roles and responsibilities taken by students and tutors and the consequent group dynamic. The group dynamic can be adversely affected by individuals. Evaluation of the processes of small group learning can provide diagnoses of the behaviour of difficult individuals. More importantly, studies of the processes can help to develop more effective small group learning.

Introduction

Effective small group learning in medicine is a much more challenging task than is often realised; it is relatively easier to have a meandering discussion with a group of medical students. It is much more difficult to get them to discuss constructively, to question and, most important of all, to think. Indeed many texts and articles on learning in small groups put too much emphasis on the role of the tutor and too little on the role of the students. But, as Stenhouse (1971) observed, '…developing small group teaching depends as much on student training as on teacher training'. To this point, we would add that an important part of the role of a tutor is to help students to develop their discussion skills and thinking beyond those attained in senior secondary school.

This theme of using discussion to facilitate thinking is the core of this Guide. It is therefore not directly concerned with small group learning in laboratories, skill centres, bedside teaching or the operating theatre, although it is hoped that these sessions will involve students in thinking. Its purpose is to help less experienced lecturers and registrars to develop the discussion and cognitive skills of their students, including interns, and their own skills in methods of learning which are primarily concerned with interpersonal interaction e.g. tutorials and seminars. The Guide is also intended to refresh the knowledge and expertise of more experienced lecturers and consultants engaged in teaching. It provides guidelines and suggestions on facilitating talking and thinking in groups; it considers the various methods of small group work and it outlines ways of evaluating the effectiveness of small group learning. Despite the importance of learning in small groups in medicine, there has been surprisingly little research on small group work other than in problem based learning (PBL). Hence this Guide draws on the views of experts and practitioners as well as the relevant research.

Practice points

- Communication and cognitive skills of the tutor and the students are the basis of effective small group learning, not the methods used.
- Questioning, listening and responding are key skills for tutors and students to develop.
- Facilitating methods, such as thinking time and buzz groups, can improve generic methods of small group learning.
- Attention to the dynamic of the group is important.
- The socio-emotional well being of the group is important for success in the task of the group.
- Although there are changes in technology, developing discussion and cognitive skills remains a priority.
- The effectiveness of small group learning sessions can be improved by observing the processes of group interaction.

Groups and their effectiveness

Before embarking upon the main topics, it might be useful to clarify what constitutes a group and a small group, the likely benefits of small group learning and the effectiveness of small group work.

Strictly speaking, a collection of individuals is not a group until they interact. In some forms of small group learning, the interaction may be primarily with the tutor, as in some sessions in basic sciences; the interaction may be predominantly

Correspondence: S. Edmunds, Department of Psychology, University of Westminster, 309 Regent Street, London W1B 2UW, UK. Tel: 44 20 79115000; fax: +44 (0)207 911 5106; email: edmunds@westminster.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/10/090715–12 © 2010 Informa UK Ltd.
DOI: 10.3109/0142159X.2010.505454

2010; 32: 802–811 MEDICAL TEACHER

AMEE GUIDE

How to measure the quality of the OSCE: A review of metrics – AMEE guide no. 49

GODFREY PELL, RICHARD FULLER, MATTHEW HOMER & TRUDIE ROBERTS
University of Leeds, UK

Abstract

With an increasing use of criterion-based assessment techniques in both undergraduate and postgraduate healthcare programmes, there is a consequent need to ensure the quality and rigour of these assessments. The obvious question for those responsible for delivering assessment is how is this 'quality' measured, and what mechanisms might there be that allow improvements in assessment quality over time to be demonstrated? Whilst a small base of literature exists, few papers give more than one or two metrics as measures of quality in Objective Structured Clinical Examinations (OSCEs). In this guide, aimed at assessment practitioners, the authors aim to review the metrics that are available for measuring quality and indicate how a rounded picture of OSCE assessment quality may be constructed by using a variety of such measures, and also to consider which characteristics of the OSCE are appropriately judged by which measure(s). The authors will discuss the quality issues both at the individual station level and across the complete clinical assessment as a whole, using a series of 'worked examples' drawn from OSCE data sets from the authors' institution.

Introduction

With increasing scrutiny of the techniques used to support high-level decision-making in academic disciplines, criterion-based assessment (CBA) delivers a reliable and structured methodological approach. As a competency-based methodology, CBA allows the delivery of 'high stakes' summative assessment (e.g. qualifying level or degree level examinations), and the demonstration of high levels of *both* reliability and validity. This assessment methodology is attractive, with a number of key benefits over more 'traditional' unstructured forms of assessment (e.g. *viva voce*) in that it is absolutist, carefully standardised for all candidates, and assessments are clearly designed and closely linked with performance objectives. These objectives can be clearly mapped against curricular outcomes, and where appropriate, standards laid down by regulatory and licensing bodies that are available to students and teachers alike. As such, CBA methodology has seen a wide application beyond summative assessments, extending into the delivery of a variety of work-based assessment tools across a range of academic disciplines (Norcini & Burch 2007; Postgraduate Medical Education and Training Board 2009). CBA is also now being used in the UK in the recruitment of junior doctors, using a structured interview similar to that used for selecting admissions to higher education programmes (Eva et al. 2004).

The Objective Structured Clinical Examination (OSCE) uses CBA principles within a complex process that begins with 'blueprinting' course content against pre-defined objectives (Newble 2004). The aim here is to ensure both that the 'correct' standard is assessed and that the content of the OSCE is objectively mapped to curricular outcomes. Performance is scored, at the station level, using an item checklist, detailing individual (sequences of) behaviours, and by a global grade, reliant on a less deterministic overall assessment by examiners (Cohen et al. 1997; Regehr et al. 1998).

Practice points

- It is important to always evaluate the quality of a high-stakes assessment, such as an OSCE, through the use of a range of appropriate metrics.
- When judging the quality of an OSCE, it is very important to employ more than one metric to gain an all-round view of the assessment quality.
- Assessment practitioners need to develop a 'toolkit' for identifying and avoiding common pitfalls.
- The key to widespread quality improvement is to focus on station level performance and improvements, and apply these within the wider context of the entire OSCE assessment process.
- The routine use of metrics within OSCE quality improvement allows a clear method of measuring the effects of change.

Central to the delivery of any successful CBA is the assurance of sufficient quality and robust standard setting, supported by a range of metrics that allow thoughtful consideration of the *performance of the assessment as a whole*, rather than just a narrow focus on candidate outcomes (Roberts et al. 2006). 'Assessing the assessment' is vital, as the delivery of OSCEs are complex and resource intensive, usually involving large numbers of examiners, candidates, simulators and patients, and often taking place across parallel sites.

Correspondence: G. Pell, Medical Education Unit, Leeds Institute of Medical Education, University of Leeds, Level 7, Room 7.20, Worsley Building, Clarendon Way, Leeds LS2 9NL, UK. Tel: 44 113 23434378; fax: 44 113 23432597; email: g.pell@leeds.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/10/100802–10 © 2010 Informa UK Ltd.
DOI: 10.3109/0142159X.2010.507716

Medical Teacher, Vol. 21, No. 3, 1999

AMEE Medical Education Guide No 16: Study guides—their use and preparation

R.M. HARDEN, J.M. LAIDLAW & E.A. HESKETH
Centre for Medical Education, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK

SUMMARY *Study guides can make a major contribution to learning. They are likened to a tutor sitting on the student's shoulder—available 24 hours a day to advise the student what he/she should be doing at any stage in their study. Study guides are different from textbooks. They can be seen as a response to changes taking place in the curriculum, to the challenge of information overload and to different approaches to learning. Study guides have three roles in facilitating learning: (1) assisting in the management of student learning; (2) providing a focus for student activities relating to the learning; (3) providing information on the subject or topic of study. A study guide triangle model can be used to represent these different roles. Guides can be placed at different points in the triangle reflecting the relative emphasis on these three functions. The composition of a study guide will depend on its purpose. Study guides may include an overview of the course, the expected learning outcomes, the prerequisites, the timetable, the learning strategies and opportunities, assessment information, staff contacts and personal comments from staff. The guide can be designed to encourage students to interact with the subject through questions, student activities and self-assessment exercises. The guide may be developed as a portfolio or record of students' information. Extracts from previously published content information or new information on the topic produced by the authors can be included in the guide. Steps in preparing a guide can be considered under the following headings: (1) deciding on the function and format of the guide; (2) relating the study guide to the curriculum; (3) writing the guide. A well-written guide is a management tool that encourages both the teacher and the student to assume responsibility for learning.*

Introduction

Travel guides are an expanding area in publishing. Their popularity stems from travellers' needs to seek guidance or support when visiting a country or area, perhaps for the first time. Travellers recognize that, to maximize the often limited time at their disposal, they need to be pointed in the right direction to visit the attractions or sights of most interest to them. A good travel guide can meet their needs. The guide will help them to get the maximum benefit from their visit and help them to understand and appreciate what they are seeing. Advice is usually contained in the guide relating to accommodation and the different forms of transport available at the destination and the relative costs. Information in the guide may be read in advance of the visit to prepare the traveller for the journey. Some travellers prefer to plan their own itinerary. In these circumstances, information in a travel guide is invaluable.

Just as a travel guide is a useful resource for the traveller, a study guide serves the same functions relative to students' studies. It highlights, for example, what students should aim to achieve as they work through a curriculum. It emphasizes the areas which are essential to study and the areas which may be of specific interest to some students. The study guide provides the students with the understanding or background necessary for them to appreciate the areas being studied. It enables students to make the best use of available learning opportunities and to tailor these opportunities to meet their specific needs. Through study guides, students are encouraged to develop effective study skills and to become independent learners.

This AMEE publication outlines the concept of study guides, and how they can be prepared and used most effectively. The ideas in this booklet have been developed from our personal experiences in preparing study guides for different target groups and to fulfil different purposes. To emphasize many of the important features of guides we have used examples from practice.

We hope you find this publication helpful. It has been divided into 10 sections. You can choose to read through the booklet systematically or skim through it reading the sections that are of particular interest.

(1) *The summary*. You may already have read this. It highlights some of the key issues in preparing and using a study guide.
(2) *Introduction*. This section introduces the concept of a study guide and the contents of this booklet.
(3) *What is a study guide?* This provides a short description of the key features of a study guide and how a study guide is different from a textbook.
(4) *The context in which study guides have become important*. Study guides can be seen as a response to current developments in education.
(5) *Why use a study guide?* The reasons why, if you have responsibilities in the field of education, you cannot ignore study guides.
(6) *What makes up a study guide?* An account of the wide range of components that can go in to make up a study guide.
(7) *What type of study guide should you produce?* A novel way of looking at study guides and deciding the emphasis you wish to give to your own guide.
(8) *How to prepare a study guide*. Practical hints on preparing your own study guide.
(9) *Conclusions*. Some final words about developing and using study guides.
(10) *References*. Where you can read more about the subject if you are interested.

Although the illustrated examples are from the field of medical education, we believe that those working in other disciplines will find the booklet of value.

0142-159X/99/030248-18

Medical Teacher, Vol. 21, No. 5, 1999

AMEE Guide No. 17: Writing for journal publication

GLENNYS PARSELL & JOHN BLIGH

University of Liverpool, UK

To write an article of any sort is, to some extent, to reveal ourselves. Hence, even a medical article is, in a sense, something of an autobiography. (John Chalmers Da Costa, *Selected Papers and Speeches*, 1991)

Introduction

Why is a guide needed?

We have designed this guide to help both the novice author and the more experienced writer to plan, organize and write up their findings, and reach an appropriate audience as quickly as possible (Box 1). We hope that you will find the guide useful, whether you are a clinician, an academic member of university staff or a medical educator from either background.

Box 1. Why is a guide needed?

- To avoid inaccurate, unclear and complicated writing styles To ensure compliance with journal guidelines
- Different types of research require different writing styles and formats
- Different types of writing require different writing styles
- People have different thinking and writing characteristics

This guide is a clear and simple response to the many difficulties experienced by authors at all stages of the publishing process. Many authors have writing difficulties that can be resolved fairly simply, thus saving time and wasted effort. But writing does not exist in a vacuum. You have to know and understand the demands and needs of various types of reader, and whether, for example, an internal report, a grant application, a review article, an academic paper or a short communication is the appropriate way to convey your message. The information you want to share may conveniently fit into an accepted scientific structure, or you may be attempting to provoke a wider discussion amongst colleagues about contentious contemporary issues. Whatever queries you have, we hope that somewhere in this guide you will find the help you need, or that we can point you in the right direction through further reading. There are several useful books that provide prospective writers with advice on academic writing, particularly for scientific journals (Huth, 1982; Hall, 1994; Albert, 1996; Goodman & Edwards, 1997). This guide draws together the ideas and principles presented in these books and other journal articles in a concise and simple way.

Correspondence: Glennys Parsell, Department of Health Care Education, Faculty of Medicine, 2nd Floor, Thornley Building, Brownlow Street, Liverpool L69 3BX, UK. Tel: (44) 0151 794 5856/5665; fax: (44) 0151 794 4777; email: http://www.dhce.liv.ac.uk

There are many types of journal article, each calling for a different writing approach. Some tips to help you with these different types of article are given later. In this guide we are using the research paper as our principal example. We assume that you have already carried out your research thoroughly and accurately, and have reached the stage where you have something important to say to a wider audience. It is at this point that most difficulties occur. Getting your paper published is not only about writing style, though that is clearly important, but is also about understanding the entire publishing process. We will be dealing with each stage of this process as it is usually encountered.

The writer, the message and the audience

Components of the publishing process

For its basic structure, the guide uses three essential components of the publishing process. These components are, first, you as a writer—your personal characteristics, the skills you need and your preferred way of working; second, your message—what you want to say and how to say it; and third, your audience—the people who read your work and how they affect your writing (Figure 1a). The effectiveness with which these components work together affects the quality of the final publication (Figure 1b). Finally, we consider the ethical issues that arise when information is placed in the public domain.

The writer

Why write?

Before you begin the writing process, you must first consider yourself as a writer. What are your reasons for writing? Does this motivation come from within yourself? Does it stem, for example, from a desire to share your knowledge with others, to further your career, to meet a challenge or for peer approval? You may be motivated altruistically, for example, to improve your clinical practice. Or are you mainly driven by external pressures? Are you an academic for whom the quality and quantity of your research activity and publication record are assessed as one of the principal functions of your job? Alternatively, are you a clinician where your major difficulty is finding enough time for writing to be productive? Do you enjoy planning and carrying out research but find writing up a difficult chore that you would prefer to avoid or defer? There are certainly compelling reasons for writing. The context of health care is changing continuously, and mixed teams of professionals must work together

ISSN 0142-159X print 1466-187X online/99/050457-12 © 1999 Taylor & Francis Ltd

Medical Teacher, Vol. 22, No. 2, 2000

AMEE GUIDE

AMEE Guide No. 18: Standard setting in student assessment

MIRIAM FRIEDMAN BEN-DAVID
Centre for Medical Education, University of Dundee, UK

SUMMARY *Licensure, credentialling and academic institutions are seeking new innovative approaches to the assessment of professional competence. Central to these recent initiatives is the need to determine standards of performance, which separate the competent from the non-competent candidate. Setting standards for performance assessment is a relatively new area of study. Consequently, there is no one recommended approach to setting standards. The goal of this guide is to familiarize the reader with the framework, principles, key concepts and practical considerations of standard setting approaches and to enable the reader to make 'educated' choices in selecting the most appropriate standard setting approach for their testing needs.*

Why should we use standard-setting procedures?

In designing assessment tasks, test developers incorporate meaningful and essential performance criteria designed to provide evidence that candidates have successfully completed the task. Ideally, candidates should demonstrate mastery of competence by responding correctly to the task criteria and by achieving the maximum scoring points. However, in reality, candidates may demonstrate a variety of performance profiles that may range from non-competent through minimally competent to fully competent. A requirement of mastery approach to performance (fully competent) for passing the test may appear unrealistic in most situations, owing to the complex nature of a medical task and measurement error. Consequently, test developers need an educational tool by which they determine the cut-off point on the scoring scale that separates the non-competent from the competent. The traditional approaches in defining such a cut-off point (i.e. responding correctly to 70% of the items) do not provide robust and valid evidence for pass/fail decisions. The problem intensifies when the test results hold serious promotion or career consequences for the candidates.

These are the questions the standard-setting guide will address by providing both theoretical and practical guidelines to the reader.

The goal of this guide

Historically, standard-setting methods were most commonly employed on multiple-choice and other written examinations (Hambleton, 1995; Jaeger *et al.*, 1996). During the last decade, with the emergence of performance assessment methods in general, and credential examinations in the professions in particular, there was a need to re-examine the fitness of existing methods of standard setting for the complex nature of performance assessment. A number of standard-setting approaches are currently available for both written and performance tests. Information through recent research studies may assist the reader to formulate an 'educated' choice of a particular method. Some assessment methods or procedures may better fit one standard-setting approach vs. another. Therefore, the present guide will describe a number of approaches and will focus in detail on one commonly used approach, the 'Modified Angoff', as an example and a guide for a standard-setting framework. The principles, key concepts and the practical considerations outlined in this guide may serve as common consideration for most standard-setting approaches. Whilst setting standards on a written examination is essential for good testing practice, owing to rapid developments in testing of professionals, special attention will be given in this guide to performance assessment. The practical example will outline a process of setting standards for performance assessment. However, it is important that the reader distinguishes between the main characteristics of written examination and performance assessment. A section of this guide will highlight some questions concerning the differences between the two modes of assessment, with regard to standard-setting procedures.

The medical education field will benefit greatly from new innovative approaches to setting standards for performance-assessment measures. It is hoped that the present guide will stimulate the reader to explore new ways of setting standards for minimally competent candidates as well as for fully competent candidates.

Key concepts

The goal of this guide

To familiarize the reader with the framework, the principles, key concepts and practical considerations of standard setting approaches and to enable the reader to make 'educated' choices in selecting the most appropriate standard setting approach for their testing needs.

Correspondence: Dr Miriam Friedman Ben-David, Centre for Medical Education, University of Dundee, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK. Tel: +44 (0)1382 631976; fax: +44 (0)1382 645748; email: mfbendavid@aol.com

ISSN 0142-159X (print)/ISSN 1466-187X (online)/00/020120-11

Medical Teacher, Vol. 22, No. 3, 2000

AMEE GUIDE

AMEE Medical Education Guide No. 19: Personal learning plans

MAGGIE CHALLIS
Queen's Medical Centre, University of Nottingham, UK

SUMMARY *Personal learning plans are being introduced and developed across the breadth of medical education—from the early years of undergraduate training through to continuing professional development for experienced clinicians. This Guide shows how and where they can be used, charting their history across higher education in the UK, indicating how they link with other professional development initiatives such as appraisal and revalidation, and giving an educational rationale for their use in enhancing lifelong learning. It offers a simple, stage-by-stage strategy for developing a personal learning plan, and for supporting others as they undertake the process themselves.*

What is in this guide?

The issue of personal learning plans, while not new in many educational settings, has recently come to the fore in medical education and professional development. This Guide offers a view on what personal learning plans are, why they are important at the current time, and how they may be approached, developed and evaluated in a range of contexts. It also places the development and history of personal learning plans within an educational rationale that recognizes the need for learners to control their own learning, and for the use of reflection on and in professional practice in order to maximize effective learning.

The document is divided into three parts. Part 1 introduces the basics of personal learning plans. Part 2 looks at the background in which personal learning plans have developed, and their relevance to medical education. Part 3 offers a stage-by-stage process which should help you when you come to develop your own plan.

Part One: The basics

What are personal learning plans?

Personal learning plans represent a way in which you can identify:

- what you need to learn;
- why you need to learn it;
- how you are going to learn it;
- how you will know when you have learned it;
- in what time frame you are going to learn it
- how your intentions link to past and future learning.

The same or a very similar process appears under several different names:

- learning contracts;
- learning agreements;
- personal development planning;
- personal audit;
- personal action planning;
- learner profiling.

Essentially, the principles underpinning the practice of identifying and meeting learning needs are the same:

- putting you, the learner, at the centre of the learning process, using your current practice as the basis of learning;
- the development of your autonomy as a learner in seeking ways to meet your own individual learning needs;
- the close integration of theory and practice in how you work and develop as a professional;
- enhancing your motivation to learn and to ask appropriate questions of yourself and others;
- leaving planned learning open to re-negotiation as your personal needs and circumstances change, and your learning progresses.

Another common aspect which links the various approaches to planning for personal learning and development is the use of a mentor (or sometimes a co-learner) to support the development of the plan and put it into operation.

At a team or organizational level, the process also ties into systems of appraisal, quality management and educational evaluation. The model of personal learning planning bears much resemblance to the process of managing strategic change and indeed clinical audit. The key points throughout all of these are:

- What is the current situation?
- How could it be improved?
- How can this be achieved?
- What will it look like when we get there?

As the purpose and underpinning principles leading to means of achieving the end are essentially the same whatever the nomenclature, this paper will use the phrase 'personal learning plans' throughout, although much of the literature cited uses the phrase 'learning contracts'.

Correspondence: Maggie Challis, Senior Lecturer in Medical Education, Centre for Postgraduate and Continuing Medical Education, Queen's Medical Centre, University of Nottingham, Nottingham NG7 2UH, UK. Tel: +44 (0)115 919 4418; email: maggie.challis@nottingham.ac.uk

ISSN 0142-159X (print)/ISSN 1466-187X (online)/00/030225-12

Medical Teacher, Vol. 22, No. 4, 2000

AMEE Guide No 20: The good teacher is more than a lecturer—the twelve roles of the teacher

R.M. HARDEN & JOY CROSBY
Centre for Medical Education, University of Dundee, UK

SUMMARY *Teaching is a demanding and complex task. This guide looks at teaching and what it involves. Implicit in the widely accepted and far-reaching changes in medical education is a changing role for the medical teacher. Twelve roles have been identified and these can be grouped in six areas in the model presented: (1) the information provider in the lecture, and in the clinical context; (2) the role model on-the-job, and in more formal teaching settings; (3) the facilitator as a mentor and learning facilitator; (4) the student assessor and curriculum evaluator; (5) the curriculum and course planner; and (6) the resource material creator, and study guide producer. As presented in the model, some roles require more medical expertise and others more educational expertise. Some roles have more direct face-to-face contact with students and others less. The roles are presented in a 'competing values' framework—they may convey conflicting messages, e.g. providing information or encouraging independent learning, helping students or examining their competence. The role model framework is of use in the assessment of the needs for staff to implement a curriculum, in the appointment and promotion of teachers and in the organization of a staff development programme. Some teachers will have only one role. Most teachers will have several roles. All roles, however, need to be represented in an institution or teaching organization. This has implications for the appointment of staff and for staff training. Where there are insufficient numbers of appropriately trained existing staff to meet a role requirement, staff must be reassigned to the role, where this is possible, and the necessary training provided. Alternatively, if this is not possible or deemed desirable, additional staff need to be recruited for the specific purpose of fulfilling the role identified. A 'role profile' needs to be negotiated and agreed with staff at the time of their appointment and this should be reviewed on a regular basis.*

The teacher and changes in medical education

Changes in medical education

Medical education has seen major changes over the past decade. Integrated teaching, problem-based learning, community-based learning, core curricula with electives or options and more systematic curriculum planning have been advocated (Harden *et al.*, 1984; Harden, 1986a; General Medical Council, 1993; Walton, 1993; Harden & Davis, 1995). Increasing emphasis is being placed on self-directed study with students expected to take more responsibility for their own learning (Rowntree, 1990). The application of new learning technologies has supported this move. New directions can be identified too in the area of assessment with increased emphasis on performance assessment, the use of techniques such as the objective structured clinical examination, the use of standardized patients, logbooks, portfolio assessment and self-assessment (Scherpbier *et al.*, 1997).

An increased emphasis on the student

The increasing emphasis on student autonomy in medical education has moved the centre of gravity away from the teacher and closer to the student. Indeed it has become fashionable to talk about learning and learners rather than teaching and the teacher. This increased attention to the learner may be seen by teachers as a loss of control and power which can lead to feelings of uncertainty, inadequacy and anxiety (Bashir, 1998). The shift may even be seen as, in some way, a devaluing of the role of the teacher. It has to be recognized, however, that this is not true, that teaching and learning are closely related and that the purpose of teaching is to enhance learning. It is important to ensure that the changing role of the teacher is not neglected in discussions about new educational strategies and approaches to curriculum development.

The changing role of the teacher

The changing role of the teacher may cause unease among those entrenched in traditional approaches to education. The Rt. Hon. Sir Rhodes Boyson MP (1996), former headmaster of Highbury Grove Comprehensive in North London, wrote "Too often, the teacher has degenerated into an uneasy mixture of classroom chum, social worker and amateur counsellor" (p. 44).

Brew & Boud (1998) have highlighted the more complex demands now being placed on university teachers and the changing nature of their work tasks, with new academic roles and the diversification of existing ones. "There has been a significant shift", they suggest, "from thinking that clever people can do everything to a recognition of the complexity and range of academic work" (p. 18). The tasks facing a teacher are not simple or easy. "Teaching", suggested Brookfield (1990), "is the educational equivalent of white water rafting".

While the Dearing Report on higher education (1997) praised British universities for their world-class record, it highlighted the pressures on teachers and the poor quality of their teaching. "There is no doubt", Dearing suggested,

Correspondence: Professor R.M. Harden, Centre for Medical Education, University of Dundee, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK. Tel: +44 (0)1382 631972; fax: +44 (0)1382 645748; email: p.a.wilkie@dundee.ac.uk

ISSN 0142-159X (print)/ISSN 1466-187X (online)/00/040334-14

Medical Teacher, Vol. 23, No. 2, 2001

AMEE GUIDE

AMEE Guide No. 21: Curriculum mapping: a tool for transparent and authentic teaching and learning

R.M. HARDEN

Centre for Medical Education and Education Development Unit, Dundee, UK

SUMMARY *The curriculum is a sophisticated blend of educational strategies, course content, learning outcomes, educational experiences, assessment, the educational environment and the individual students' learning style, personal timetable and programme of work. Curriculum mapping can help both staff and students by displaying these key elements of the curriculum, and the relationships between them. Students can identify what, when, where and how they can learn. Staff can be clear about their role in the big picture. The scope and sequence of student learning is made explicit, links with assessment are clarified and curriculum planning becomes more effective and efficient. In this way the curriculum is more transparent to all the stakeholders including the teachers, the students, the curriculum developer, the manager, the public and the researcher. The windows through which the curriculum map can be explored may include: (1) the expected learning outcomes; (2) curriculum content or areas of expertise covered; (3) student assessment; (4) learning opportunities; (5) learning location; (6) learning resources; (7) timetable; (8) staff; (9) curriculum management; (10) students. Nine steps are described in the development of a curriculum map and practical suggestions are made as to how curriculum maps can be introduced in practice to the benefit of all concerned. The key to a really effective integrated curriculum is to get teachers to exchange information about what is being taught and to coordinate this so that it reflects the overall goals of the school. This can be achieved through curriculum mapping, which has become an essential tool for the implementation and development of a curriculum. Faced with curricula which are becoming more centralized and less departmentally based, and with curricula including both core and optional elements, the teacher may find that the curriculum map is the glue which holds the curriculum together.*

The introduction of curriculum mapping

In medical education, much attention has been paid to curriculum development (Harden, 1986). Emphasis has been placed on educational strategies such as student-centred learning, problem-based learning, integrated teaching and community-based teaching (Harden *et al.*, 1984). The use of new learning technologies and new approaches to assessment have also attracted interest (Harden, 2000a). Changes have been made too in the content areas to be studied and new subjects have been added to the educational programme with less emphasis placed on some traditional areas of study (General Medical Council, 1993).

In contrast, an aspect of curriculum development which has been relatively neglected is communication about the curriculum. How do teachers and students know what is covered in the curriculum and where it is addressed? How do students know what learning opportunities are available to assist them to master each of the expected learning outcomes? How does assessment relate to the teaching programme? What resources are needed to mount each part of the programme? Curriculum mapping helps to provide answers to these and other related questions. Curriculum mapping is concerned with what is taught (the content, the areas of expertise addressed, and the learning outcomes), how it is taught (the learning resources, the learning opportunities), when it is taught (the timetable, the curriculum sequence) and the measures used to determine whether the student has achieved the expected learning outcomes (assessment).

As suggested by English (1984, p. 30), when he introduced the concept of curriculum mapping, 'The real genius of mapping is to give a broad picture of the taught curriculum'. Curriculum mapping provides curriculum developers, teachers, students and managers with a handle on the curriculum that they may not have had. It is a powerful tool for managing the curriculum. This guide illustrates how curriculum maps achieve this by making the curriculum more transparent and by linking the different aspects of the curriculum: learning outcomes to learning opportunities, different learning outcomes to each other, assessment to teaching and so on.

Curriculum mapping is about representing spatially the different components of the curriculum so that the whole picture and the relationships and connections between the parts of the map are easily seen. A curriculum is a programme of study where the whole is greater than the sum of the individual parts (Harden *et al.*, 1997). The curriculum map supports this through assembling the different pieces of the curriculum jigsaw together. This complete picture is more meaningful to the teacher, the student or the manager than the picture presented by the random collection of pieces which is often what they have.

The guide explains why curriculum mapping is an important tool in education, facilitating, as it does, many of

Correspondence: Professor R.M. Harden, Centre for Medical Education, Tay Park House, 484 Perth Road, Dundee, UK. E-mail: r.m.harden@dundee.ac.uk

ISSN 0142–159X (print)/ISSN 1466–187X online/01/020123–15 © 2001 Taylor & Francis Ltd
DOI: 10.1080/01421590120036547

Medical Teacher, Vol. 23, No. 3, 2001

AMEE GUIDE

AMEE Medical Education Guide No. 22: Refreshing lecturing: a guide for lecturers

GEORGE BROWN[1] & MICHAEL MANOGUE[2]

[1]Queen's Medical Centre, University of Nottingham, UK; [2]Faculty of Medicine, Dentistry, Psychology and Health, University of Leeds, LS2 9LU UK

SUMMARY *This guide provides an overview of research on lecturing, a model of the processes of lecturing and suggestions for improving lecturing, learning from lectures and ways of evaluating lectures. Whilst primarily directed at teachers in the healthcare professions, it is equally applicable to all teachers in higher education. Lectures are the most ubiquitous method of teaching so they are an important part of a teacher's repertoire. Lectures are at least as effective as other methods of teaching at imparting information and explaining. Intention, transmission and output are the basis of a model of lecturing. The key skills of preparing lectures, explaining and varying student activities may be derived from the model. Preparation is based on purposes, content, various structures of lectures and the preparation of audiovisual aids. The essential ingredients of explaining are clarity, interest and persuasion. By varying activities, one can renew attention and develop student learning. Learning from lectures can be improved by teaching students the structure of lectures and methods of listening and note-taking. Student ratings of lectures are useful but over-used and limited ways of evaluating lectures. Equally important is peer review and more important than either student ratings or peer feedback is reflection on the practice of lecturing by individuals and course teams.*

Purposes and context

This guide has been written to help teachers, particularly those in the healthcare professions, to refresh their approaches to lecturing and, in so doing, help them to make their lectures more refreshing for students. The guide is based on research on lecturing and the authors' experience of observing lectures and providing short courses on lecturing. It outlines various styles of lecturing, methods of structuring lectures, learning from lectures, and the skills of lecturing. It provides some suggestions for helping students to learn from lectures and for evaluating lectures.

At the outset it is stressed that the task of refreshing one's lectures is not simple. It involves reactivating and extending existing knowledge of content and techniques, the refinement of one's skills of lecturing and, perhaps, the development of new skills. Merely reading this guide may not be sufficient to improve one's lectures—just as reading a text on clinical diagnosis may not be sufficient to make one a better clinician.

Why lecture?

Given the advent of the e-revolution, why is lecturing in any form still necessary? The reasons are not hard to find. In the early years of undergraduate medical education many students attend more lectures than they see patients. By the end of their clinical years they may have attended over a thousand lectures. Lectures are a substantial part of the learning experiences of students and so merit our attention. They are the most common method of teaching and they are likely to remain so well into this century. Lecturing, then, is an important constituent of a teacher's repertoire of teaching methods. Lectures are, potentially, an economical and efficient method of conveying information to large groups of students. They *can* provide an entrée into a difficult topic, different perspectives on a subject, up-to-date résumés of research and relevant personal, clinical or laboratory experience. A lecture *can* be used to provoke thought, to deepen understanding and to enhance scientific and clinical thinking. Lectures *can* provide hints and guidelines on how to learn a topic or procedure as well as what to learn and thereby help students to develop into independent, thinking professionals. They can, in short, bring a subject alive and make it more meaningful. Alternatively, they can kill it.

Limitations of lectures

Lectures, like all methods of teaching, have limitations. They can be boring and, worse, useless. If they are merely recitations of standard texts then they are not fulfilling adequately their functions of developing understanding and motivating students to learn. If the lecture is used only to provide detailed coverage of facts and findings then the students would gain more from reading a good textbook. If lectures are the only method of teaching used then the students are not being well prepared for their future roles. A rich diversity of teaching methods is necessary for a domain as complex as the health of human beings and their communities. Lectures do not *usually* provide evidence of students' understanding and knowledge—that is explored in seminars, practical work and assessment tasks. Finally,

Correspondence: Professor George Brown, Postgraduate Dental Office, Faculty of Medicine and Health Sciences, Queen's Medical Centre, University of Nottingham, Nottingham NG7 2UH, UK.

ISSN 0142–159X (print)/ISSN 1466–187X online/01/030231–14 © 2001 Taylor & Francis Ltd
DOI: 10.1080/01421590120043000

Medical Teacher, Vol. 23, No. 4, 2001

AMEE GUIDE

AMEE Medical Education Guide No. 23 (Part 1): Curriculum, environment, climate, quality and change in medical education—a unifying perspective

J.M. GENN

Sometime of Department of Education, University of Queensland, Graduate School of Education, University of California at Los Angeles, Centre for Medical Education, University of Dundee.

SUMMARY *This paper looks at five focal terms in education—curriculum, environment, climate, quality and change—and the interrelationships and dynamics between and among them. It emphasizes the power and utility of the concept of climate as an operationalization or manifestation of the curriculum and the other three concepts. Ideas pertaining to the theory of climate and its measurement can provide a greater understanding of the medical curriculum. The learning environment is an important determinant of behaviour. Environment is perceived by students and it is perceptions of environment that are related to behaviour. The environment, as perceived, may be designated as climate. It is argued that the climate is the soul and spirit of the medical school environment and curriculum. Students' experiences of the climate of their medical education environment are related to their achievements, satisfaction and success. Measures of educational climate are reviewed and climate measures for medical education are discussed. These should take account of current trends in medical education and curricula. Measures of the climate may subdivide it into different components giving, for example, a separate assessment of so-called Faculty Press, Student Press, Administration Press and Physical or Material Environmental Press. Climate measures can be used in different modes with the same stakeholders. For example, students may be asked to report, first, their perceptions of the actual environment they have experienced and, second, to report on their ideal or preferred environment. The same climate index can be used with different stakeholders giving, for example, staff and student comparisons. In addition to the educational climate of the environment that students inhabit, it is important to consider the organizational climate of the work environment that staff inhabit. This organizational climate is very significant, not only for staff, but for their students, too. The medical school is a learning organization evolving and changing in the illuminative evaluation it makes of its environment and its curriculum through the action research studies of its climate. Considerations of climate in the medical school, along the lines of continuous quality improvement and innovation, are likely to further the medical school as a learning organization with the attendant benefits. Unless medical schools become such learning organizations, their quality of health and their longevity may be threatened.*

Aims and focus

This paper aims to assist and facilitate discourse on medical education between and among medical education administrators, medical teachers, medical students, medical education curriculum developers, assessors, researchers and, indeed, any other stakeholders in the medical education enterprise, including governments or other agencies that may supply the finances. This assistance and facilitation of discourse will, it is hoped, result in the achievement of some simplification and increased clarity in communication among all stakeholders, which, it is believed, can only serve to enhance the quality and effectiveness of the work of all participants in the medical education enterprise.

The simplification and clarification of educational discourse will involve a pentagonal or five-way perspective on medical education, with an associated consideration of meanings and connotations of five focal terms, namely Curriculum, Environment, Climate, Quality and Change, and the interrelationships and dynamics between and among these focal elements.

The paper will emphasize the power and utility of the concept of Climate, as the pivot around which the discussion of the other four concepts, of Curriculum, Environment, Quality and Change, will turn. Climate considerations, in the paper, become inextricably bound up with considerations of the other four focal concepts. Climate is shown to be an operationalization or manifestation of each of these other four focal concepts.

What is more, the now available high quality of Climate measurement means that, in some real sense, such Climate measures can serve as measures, too, of Curriculum, Environment, Quality and Change, to the extent that each of these four can be operationalized as Climate. Quite a number of qualitatively and quantitatively based workplace action-research studies of Climate itself, and its connections with Curriculum, Environment, Quality and Change, then become available, in medical education. A major purpose of the paper thus is to stimulate generation of research problems and hypotheses that not only are of theoretical interest, but may lead to valuable practical programmes in curriculum development in medical education, or to what, in topical parlance, is termed Best Evidence Medical Education (BEME) (Hart, 1999;

Correspondence: Dr J.M. Genn, 33 Ninth Avenue, St Lucia, Australia 4067. Email: J.Genn@uq.net.au

ISSN 0142–159X (print)/ISSN 1466–187X online/01/040337–08 © 2001 Taylor & Francis Ltd
DOI: 10.1080/01421590120063330

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE medical education guide no. 23 (Part 2): Curriculum, environment, climate, quality and change in medical education—a unifying perspective

J. M. Genn [abc]
[a] Department of Education, University of Queensland, [b] Graduate School of Education, University of California, Los Angeles, USA [c] Centre for Medical Education, University of Dundee,

Online Publication Date: 01 September 2001

To cite this Article Genn, J. M.(2001)'AMEE medical education guide no. 23 (Part 2): Curriculum, environment, climate, quality and change in medical education—a unifying perspective',Medical Teacher,23:5,445 — 454
To link to this Article: DOI: 10.3109/01421590109177942
URL: http://dx.doi.org/10.3109/01421590109177942

Medical Teacher, Vol. 23, No. 6, 2001

AMEE GUIDE

AMEE Medical Education Guide No. 24: Portfolios as a method of student assessment

M. FRIEDMAN BEN DAVID[1], M.H. DAVIS[1], R.M. HARDEN[1], P.W. HOWIE[2], J. KER[2] & M.J. PIPPARD[2]

[1]Centre for Medical Education, University of Dundee; [2]Ninewells Hospital & Medical School, University of Dundee, Scotland

SUMMARY *This guide is intended to inform medical teachers about the use of portfolios for student assessment. It provides a background to the topic, reviews the range of assessment purposes for which portfolios have been used, identifies possible portfolio contents and outlines the advantages of portfolio assessment with particular focus on assessing professionalism. The experience of one medical school, the University of Dundee, is presented as a case study. The current state of understanding of the technical, psychometric issues relating to portfolio assessment is clarified. The final part of the paper provides a practical guide for those wishing to design and implement portfolio assessment in their own institutions. Five steps in the portfolio assessment process are identified: documentation, reflection, evaluation, defence and decision. It is concluded that portfolio assessment is an important addition to the assessor's toolkit. Reasons for using portfolios for assessment purposes include the impact that they have in driving student learning and their ability to measure outcomes such as professionalism that are difficult to assess using traditional methods.*

Background to the use of portfolios for assessment purposes

Recent changes in medical education and training emphasize the development of teaching and learning programmes which meet the needs of the medical profession and society as a whole. Professional organizations and the public at large demand demonstration of professional attributes that ensure doctors' fitness for practice while adhering to high standards of care (GMC 1997).

The medical schools and postgraduate training programmes have responded by introducing new teaching and learning strategies that will enhance doctors' accountability. One important innovation in curriculum reform is the development of an outcome-based educational framework (Harden *et al.*, 1999). Learning outcomes of undergraduate and postgraduate training are defined broadly to allow students to recognize their progress regarding the scope and depth of their professional competences. The use of such frameworks facilitates the development of traditional learning outcomes, such as clinical skills, as well as learning outcomes defining the doctor as a professional that, in the past, have been ignored. The growing interest and concern with doctors' professional attributes is shared worldwide as indicated by the vast number of medical education papers published on the topic of professionalism during the year 2000 alone (Ginsburg *et al.*, 2000).

Furthermore, the concept of professionalism has filtered into teaching and learning strategies where students are encouraged to take responsibility for their own learning, and personalize their learning experiences. Student-centred programmes increasingly incorporate the learners' needs, as well as listen to the learners' voice. Consequently, medical schools' curricula are seeking to broaden student experiences inside and outside hospitals to allow better appreciation of the multi-context system within which doctors are now practising. The new direction of medical schools' curricula results in somewhat less structure and more authentic experiences for the trainee, which, in turn, increases self-directed learning.

Concern with the lack of continuity between undergraduate and postgraduate education is another important factor. Transition from the undergraduate to the postgraduate phase of medical education should be consistent with progression from technical discrete abilities to full integration of professional competences, which is the ultimate outcome of medical training.

Concurrent with these educational reforms, new assessment strategies are being developed to meet the needs of recent innovations in the health professions. The search for new assessment tools is a reaction against existing methods of assessment, which often have had adverse effects on the learner, the teacher and the curriculum as a whole. It is recognized that assessment tools should enhance and support learning as well as measure performance. Much current interest is in authentic, performance-based assessment (Koretz *et al.*, 1998), which also encourages learners to take responsibility for their own learning and guides the learners to accumulate evidence of learning, while incorporating a criterion-referenced interpretation of their performance.

The portfolio is an attempt to counteract the limitations of a reductionist approach to assessment. It facilitates assessment of integrated and complex abilities and takes

Correspondence: M. Friedman Ben David, Centre for Medical Education, Tay Park House, 484 Perth Road, Dundee DD2 1LR, UK

ISSN 0142–159X (print)/ISSN 1466–187X online/01/060535–17 © 2001 Taylor & Francis Ltd
DOI: 10.1080/01421590120090952

Medical Teacher, Vol. 25, No. 6, 2003, pp. 569–584

AMEE Guide No. 25: The assessment of learning outcomes for the competent and reflective physician

J.M. SHUMWAY[1] & R.M. HARDEN[2]
[1]*Office of Medical Education, West Virginia University, USA;*
[2]*International Virtual Medical School, 484 Perth Road, Tay Park House, Dundee, UK*

SUMMARY *Two important features of contemporary medical education are recognized. The first is an emphasis on assessment as a tool to ensure quality in training programmes, to motivate students and to direct what they learn. The second is a move to outcome-based education where the learning outcomes are defined and decisions about the curriculum are based on these. These two trends are closely related. If teachers are to do a better job of assessing their students, they need an understanding of the assessment process, an appreciation of the learning outcomes to be assessed and a recognition of the most appropriate tools to assess each outcome. Assessment tools selected should be valid, reliable, practical and have an appropriate impact on student learning. The preferred assessment tool will vary with the outcome to be assessed. It is likely to be some form of written test, a performance test such as an OSCE in which the student's competence can be tested in a simulated situation, and a test of the student's behaviour over time in clinical practice, based on tutors' reports and students' portfolios. An assessment profile can be produced for each student which highlights the learning outcomes the student has achieved at the required standard and other outcomes where this is not the case. For educational as well as economic reasons, there should be collaboration across the continuum of education in test development as it relates to the assessment of learning outcomes and in the implementation of a competence-based approach to assessment.*

The importance of assessment

Assessment plays a major role in the process of medical education, in the lives of medical students, and in society by certifying competent physicians who can take care of the public. The very foundation of medical curricula is built around assessment milestones for students. For example, in the United States medical students must pass a series of steps towards licensure before graduating from medical school. It is assessment and evaluation that often drives the curricula of medical schools and students measure their progress through the curriculum by the examinations they have passed. Assessment becomes a motivating force for them to learn. Society has the right to know that physicians who graduate from medical school and subsequent residency training programmes are competent and can practise their profession in a compassionate and skilful manner. It is the responsibility of the medical school to demonstrate that such competence has been achieved, and the responsibility of accreditation agencies to certify that the educational programmes in medical schools can do what they promise. Assessment is of fundamental importance because it is central to public accountability.

The General Medical Council (GMC) has the responsibility to ensure that graduates of a UK medical school have met the requirements for their next posts as house officers. In 1993 they issued their recommendations on undergraduate medical education (GMC, 1993). More recent recommendations (GMC, 2002) place greater emphasis on learning outcomes and on the assessment of the outcomes. "In line with current educational theory and research, we have adopted an outcomes-based model. This sets out what is to be achieved and assessed at the end of the medical course in terms of knowledge, skills and behaviour" (Rubin & Franchi-Christopher, 2002). Table 1 contains a summary of those recommendations as they relate to assessment.

In the United States, the Liaison Committee for Medical Education (LCME) is the accreditation agency for North American medical schools (USA and Canada). Medical schools in North America have traditionally been accredited on the quality of the elements that make up the student educational programme (e.g. faculty, research, facilities, courses and clerkships). There are essentially four questions asked during accreditation: (1) What are the goals?; (2) What did students actually learn?; (3) What is the evidence?; and (4) What needs to be changed? The LCME has instituted standards focusing on the assessment of outcomes (LCME, 2003). In outcome-based assessment the educational programme goals or learning outcomes are defined and their accomplishment is assessed. North American medical education institutions are now required to document educational outcomes in light of their institutional purposes and missions. The LCME standards pertaining to the assessment of these outcomes are included in Table 2.

Outcome-based assessment for a competent and reflective physician

Assessment is an intrinsic component of outcome-based education. Outcome-based education and performance assessment are closely related paradigms (Friedman Ben-David, 1999). Outcome-based education involves an educational approach in which the decisions about the curriculum and evaluation are driven by the learning outcomes that students should achieve (Harden *et al.*, 1999 a). In this approach, the product (student learning outcomes) defines the process (instructional methods and learning opportunities). This is distinctively different from earlier educational

Correspondence: Professor James M. Shumway, Office of Medical Education, West Virginia University, School of Medicine, PO Box 9007, Morgantown, WV 26506, USA. Email: jshumway@hsc.wvu.edu

ISSN 0142–159X print/ISSN 1466–187X online/03/060569-16 © 2003 Taylor & Francis Ltd
DOI: 10.1080/0142159032000151907

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE Guide No 26: clinical teaching in ambulatory care settings: making the most of learning opportunities with outpatients

Mr John A. Dent [a]
[a] Department of Orthopaedic and Trauma Surgery, University of Dundee, Scotland, UK

Online Publication Date: 01 June 2005
To cite this Article: Dent, John A. Mr (2005) 'AMEE Guide No 26: clinical teaching in ambulatory care settings: making the most of learning opportunities with outpatients', Medical Teacher, 27:4, 302 - 315
To link to this article: DOI: 10.1080/01421590500150999
URL: http://dx.doi.org/10.1080/01421590500150999

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE Guide No. 27: Effective educational and clinical supervision

To cite this Article: Kilminster, Sue, Cottrell, David, Grant, Janet and Jolly, Brian , 'AMEE Guide No. 27: Effective educational and clinical supervision', Medical Teacher, 29:1, 2 - 19
To link to this article: DOI: 10.1080/01421590701210907
URL: http://dx.doi.org/10.1080/01421590701210907

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE Education Guide no. 28: The development and role of departments of medical education

Margery H. Davis [a]; Indika Karunathilake [b]; Ronald M. Harden [c]
[a] Centre for Medical Education, University of Dundee, Scotland, UK
[b] Faculty of Medicine, University of Colombo, Sri Lanka
[c] IVIMEDS, Dundee, Scotland, UK

Online Publication Date: 01 December 2005
To cite this Article: Davis, Margery H., Karunathilake, Indika and Harden, Ronald M. (2005) 'AMEE Education Guide no. 28: The development and role of departments of medical education', Medical Teacher, 27:8, 665 - 675
To link to this article: DOI: 10.1080/01421590500398788
URL: http://dx.doi.org/10.1080/01421590500398788

PLEASE SCROLL DOWN FOR ARTICLE

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE Education Guide no. 29: Evaluating educational programmes

John Goldie [a]
[a] Department of General Practice, University of Glasgow, UK

Online Publication Date: 01 May 2006
To cite this Article: Goldie, John (2006) 'AMEE Education Guide no. 29: Evaluating educational programmes', Medical Teacher, 28:3, 210 - 224
To link to this article: DOI: 10.1080/01421590500271282
URL: http://dx.doi.org/10.1080/01421590500271282

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Peer assisted learning: a planning and implementation framework: AMEE Guide no. 30

Michael T. Ross [a]; Helen S. Cameron [a]
[a] The Medical Teaching Organisation, The University of Edinburgh, UK

Online Publication Date: 01 July 2007
To cite this Article: Ross, Michael T. and Cameron, Helen S. (2007) 'Peer assisted learning: a planning and implementation framework: AMEE Guide no. 30', Medical Teacher, 29:6, 527 - 545
To link to this article: DOI: 10.1080/01421590701665886
URL: http://dx.doi.org/10.1080/01421590701665886

2007; 29: 855–871 MEDICAL TEACHER

AMEE GUIDE

Workplace-based assessment as an educational tool: AMEE Guide No. 31

JOHN NORCINI[1] & VANESSA BURCH[2]

[1]Foundation for Advancement of International Medical Education and Research, Philadelphia, USA, [2]University of Cape Town, South Africa

Abstract

Background: There has been concern that trainees are seldom observed, assessed, and given feedback during their workplace-based education. This has led to an increasing interest in a variety of formative assessment methods that require observation and offer the opportunity for feedback.

Aims: To review some of the literature on the efficacy and prevalence of formative feedback, describe the common formative assessment methods, characterize the nature of feedback, examine the effect of faculty development on its quality, and summarize the challenges still faced.

Results: The research literature on formative assessment and feedback suggests that it is a powerful means for changing the behaviour of trainees. Several methods for assessing it have been developed and there is preliminary evidence of their reliability and validity. A variety of factors enhance the efficacy of workplace-based assessment including the provision of feedback that is consistent with the needs of the learner and focused on important aspects of the performance. Faculty plays a critical role and successful implementation requires that they receive training.

Conclusions: There is a need for formative assessment which offers trainees the opportunity for feedback. Several good methods exist and feedback has been shown to have a major influence on learning. The critical role of faculty is highlighted, as is the need for strategies to enhance their participation and training.

Introduction

For just over two decades leading educationists, including medical educators, have highlighted the intimate relationship between learning and assessment. Indeed, in an educational context it is now argued that learning is the key purpose of assessment (van der Vleuten 1996; Gronlund 1998, Shepard 2000). At the same time as this important connection was being stressed in the education literature, there were increasing concerns about the workplace-based training of doctors. A study by Day et al. (1990) in the United States documented that the vast majority of first-year trainees in internal medicine were not observed more than once by a faculty member in a patient encounter where they were taking a history or doing a physical examination. Without this observation, there was no opportunity for the assessment of basic clinical skills and, more importantly, the provision of feedback to improve performance.

As one step in encouraging the observation of performance by faculty, the American Board of Internal Medicine proposed the use of the mini-Clinical Evaluation Exercise (mini-CEX) (Norcini et al. 1995). In the mini-CEX, a faculty member observes a trainee as he/she interacts with a patient around a focused clinical task. Afterwards, the faculty member assesses the performance and provides the trainee feedback. It was expected that trainees would be assessed several time throughout the year of training with different faculty and in different clinical situations.

Practice points

- The research literature on work-based formative assessment and feedback suggests that it is a powerful means for changing the behaviour of learners.
- Several formative assessment methods have been developed for use in the workplace and there is preliminary data evidence of their reliability and validity.
- The efficacy of feedback is enhanced if it is consistent with the needs of the learner, focuses on important aspects of the performance in the work-place, and has characteristics such as being timely and specific.
- Faculty development is critical to the quality and effectiveness of formative assessment.
- Strategies to encourage the participation of faculty are critical to the successful implementation of formative assessment.

An advantage of the mini-CEX and other workplace-based methods is that they fulfil the three basic requirements for assessment techniques that facilitate learning (Frederiksen 1984; Crooks 1988; Swanson et al. 1995; Shepard 2000):(1) The content of the training programme, the competencies expected as outcomes, and the assessment practices are aligned (2) Trainee feedback is provided during and/or after assessment

Correspondence: John Norcini, Foundation for Advancement of International Medical Education and Research (FAIMER) 4th Floor 3624 Market St, Philadelphia PA 19104, USA. Tel: 1 215 823 2170; fax: 1 215 386 2321; email: JNorcini@faimer.org

ISSN 0142–159X print/ISSN 1466–187X online/07/09-10 0855–17 © 2007 Informa UK Ltd.
DOI: 10.1080/01421590701775453

AMEE GUIDE SUPPLEMENTS

Workplace-based assessment as an educational tool: Guide Supplement 31.2 – Viewpoint†

S. J. LEINSTER
University of East Anglia, UK

Norcini and Burch (Norcini & Burch 2007) give a useful and authoritative overview of the current literature on the role of workplace-based assessment with an evaluation of the main approaches that are being used.

There are two main purposes for assessment within medical training. The first of these is summative when decisions are made about the candidate's progression to the next stage of training or certification of completion of training. The second is formative when the main purpose of the assessment is to provide information about the strengths and weaknesses of the trainee. This information can then be used to adapt the learning opportunities to meet the trainee's identified needs. The focus in the past has been on developing assessment tools that were valid and reliable. This is a particular challenge when assessing clinical performance. As a result, clinical performance has been increasingly measured in artificial settings where the variables have been tightly constrained such as the OSCE (Harden et al. 1975). This approach can only measure the 'shows how' level of Millar's skills triangle. It is clearly desirable to measure what the candidate 'does' in practise and this is one justification for the attempts to develop methods of workplace-based assessment.

Medical trainees at all levels complain that they receive inadequate feedback although feedback has been shown in studies to be an effective tool for increasing learning. Difficulties have been identified in engaging faculty in the process and ensuring accuracy of their observation and feedback. Even when training is given to faculty engagement in routine feedback may be poor. The guide outlines validated instruments that are in use internationally for workplace-based assessment. All have been shown to be feasible and effective in study settings although there has been no formal direct comparison of their relative effectiveness. The combination of methods now being used as a formal part of the assessment of the Foundation Programme for newly-qualified doctors in the UK is described. This may provide further information on the utility of these approaches in routine practice although it is not clear that the fundamental difficulties of clinician engagement and training have been solved.

The authors identify three challenges that need to be met if workplace-based assessment is to be implemented successfully:

- Gaining a better understanding of why faculty do not routinely engage in trainee assessment and feedback.
- Improving the quality of the assessments and feedback given to trainees through a concerted faculty development effort.
- Determining the impact of feedback on trainee learning behaviour and performance.

This guide provides a starting point for addressing these challenges and setting up effective feedback systems in clinical settings. It concentrates on using workplace-based assessment as a formative tool. It does not address the additional problems that are involved in obtaining consistency of judgement between raters and cases across geographically disparate sites which provide the main weakness in using workplace-based assessment for summative decisions.

Note on Contributor

SAM LEINSTER, BSc, MD, FRCS, SFHEA, is the Inaugural Dean of the School of Medicine, Health Policy and Practice at the University of East Anglia where he is Professor of Medical Education. His clinical training is in Surgical Oncology which he continues to practice.

References

Norcini J, Burch V. 2007. Workplace-based assessment as an educational tool: AMEE Guide no. 31. Med Teach. 29:855–871.

Harden RM, Stevenson M, Downie WW, Wilson GM. 1975. Assessment of clinical competence using objective structured examination. BMJ 1(5955):447–451.

Correspondence: S.J. Leinster, School of Medicine, Health Policy and Practice, University of East Anglia, University Plain, Norwich NR4 7TJ, UK. Tel: 01603 593939; fax: 01603 593172; email: sam.leinster@btopenworld.com

†This AMEE guide was published as: Norcini J, Burch V. 2007. Workplace-based assessment as an educational tool: AMEE Guide no. 31. Med Teach 29:855-871.

ISSN 0142–159X print/ISSN 1466–187X online/09/111032–1 © 2009 Informa Healthcare Ltd.
DOI: 10.3109/01421590903323598

2010; 32: e369–e372 MEDICAL TEACHER

AMEE GUIDE SUPPLEMENTS

Workplace-based assessment as an educational tool: Guide supplement 31.3 – Viewpoint[1]

HABIBA SAEDON[1], M. H. M. SAEDON[2] & S. P. AGGARWAL[3]

[1]Manchester Royal Eye Hospital, UK, [2]Freeman Hospital, UK, [3]Birmingham Midland Eye Centre, UK

Introduction

Workplace-based assessments (WBAs) are being increasingly used during postgraduate medical training as a method of assessing competence. Southgate (1999) defined competence in a doctor as being 'composed of cognitive, interpersonal skills, moral and personality attributes. It is in part the ability, in part the will, to consistently select and perform relevant clinical tasks in the context of the social environment in order to resolve health problems of individuals in an efficient, effective economic and humane manner'. There was previously a concern that trainees were infrequently observed, assessed and given feedback during their workplace-based education. This has led to an increasing interest in a variety of formative assessment methods that require observation and offer the opportunity for feedback (Norcini & Burch 2007). There are many methods including direct observation of procedural skills (DOPS), mini-clinical evaluation exercises (mini-CEX) and case-based discussions (CBD). These methods are used in ophthalmology, for example, where the curriculum for ophthalmic specialty training consists of 180 defined learning outcomes in 13 domains of clinical practice, each of which can be mapped to the General Medical Council's (GMC) description of good medical practice.

Aims and objectives of WBAs

Traditionally, training was defined in terms of time spent in training and in different clinical posts or attachments. It was assumed that learning occurs naturally as part of routine clinical work. There was no organised educational programme with clear objectives. The involvement by senior doctors was unstructured and haphazard and minimum attention has been paid to the educational needs of the trainee (Holm 2002). There has been a move in the recent years towards competency-based medical training because patients expect doctors to diagnose, plan management, carryout practical procedures and behave in a reasonable way demonstrating a caring and humanistic attitude (Carr 2004). WBAs have been introduced in the recent years to demonstrate this. The main aims of WBAs are to aid learning through objective feedback and to provide evidence that the competencies required to progress to the next level of training have been achieved (Beard 2008). The recent change in working patterns of doctors in training has meant that the traditional systems of education are under increasing pressure and that there is the need to maximise new opportunities for learning (Carr 2006). Observing trainees during their daily practice is a time-efficient way of determining their level of competence. By giving great importance to the concept of feedback, trainees are encouraged to reflect upon the learning experience and can therefore improve their skills. Strengths, developmental needs and action plans are formulated to aid this learning. This increasing emphasis towards a competency-based training system is not unique to the UK; in the USA and in other countries around the world, there is a pressure to increase accountability and to formalise the maintenance of standards as well as setting standards for entry into practice (Southgate 1999). There is also a change of role definition and job responsibility towards health professionals other than doctors marking the assessments. This is particularly the case within ophthalmology, where an optometrist may be better qualified to assess a trainee performing retinoscopy, which is one of the skills required to progress to ST4, or an orthoptist may be suitable to assess the performance of visual fields or a cover test.

How WBAs are applied

For ST1 in ophthalmology, there are over 50 assessments to be completed. Trainees and trainers alike often lament that the forms take too much time to fill in. One study showed that the mean time taken to complete the mini-CEX (including feedback) was 25 min. The DOPS required the duration of the procedure being assessed plus an additional third of this time for feedback. The mean time required for each rater to complete his or her multi-source feedback (MSF) form was 6 min. (Wilkinson et al. 2008). With good preparation and organisation, it is possible to complete these forms and the benefits gained should outweigh the time taken to fill them in. Reduction in surgical experience means that more training will need to be undertaken on simulations, although experience and assessment in the operating room must remain the 'gold-standard'. Simulation training will require the provision of properly resourced surgical skill facilities in every hospital. The key to reliable assessment and constructive feedback is

Correspondence: Habiba Saedon, Manchester Royal Eye Hospital, Oxford Road, Manchester, M13 9WH, UK. Tel: 0161 276 1234; fax: 0161 276 5642; email: habibasaedon@doctors.org.uk

ISSN 0142–159X print/ISSN 1466–187X online/10/090369–4 © 2010 Informa UK Ltd.
DOI: 10.3109/01421590903548547

Medical Teacher

Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE Guide 32: e-Learning in medical education Part 1: Learning, teaching and assessment

Rachel Ellaway [a]; Ken Masters [b]
[a] Northern Ontario School of Medicine, Canada
[b] ITHealthEd, KÖstendorf, Austria

Online Publication Date: 01 January 2008

To cite this Article: Ellaway, Rachel and Masters, Ken (2008) 'AMEE Guide 32: e-Learning in medical education Part 1: Learning, teaching and assessment', Medical Teacher, 30:5, 455 — 473

To link to this article: DOI: 10.1080/01421590802108331
URL: http://dx.doi.org/10.1080/01421590802108331

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

e-Learning in medical education Guide 32 Part 2: Technology, management and design

Ken Masters [a]; Rachel Ellaway [b]
[a] ITHealthEd, Austria
[b] Northern Ontario School of Medicine, Canada

Online Publication Date: 01 January 2008

To cite this Article: Masters, Ken and Ellaway, Rachel (2008) 'e-Learning in medical education Guide 32 Part 2: Technology, management and design', Medical Teacher, 30:5, 474 — 489

To link to this article: DOI: 10.1080/01421590802108349
URL: http://dx.doi.org/10.1080/01421590802108349

AMEE GUIDE SUPPLEMENT 33.1 Viewpoint

Faculty development: Yesterday, today and tomorrow

Yvonne Steinert
McGill University, Canada

Faculty development: From workshops to communities of practice

"Participating in a faculty development workshop gives me a sense of community, self-awareness, motivation and validation of current practices and beliefs..."
Steinert, 2008

Faculty development, or staff development as it is often called, has become an increasingly important component of medical education, and most medical schools now offer formal faculty development programmes and activities. As McLean and colleagues have stated in their recent AMEE Guide "with demands on medical faculties to be socially responsible and accountable, there is increasing pressure for the professionalization of teaching practice". (McLean et al. 2008)

To date, most faculty development initiatives described in the literature consist of formal (or structured) programs such as workshops and seminars, longitudinal programmes and fellowships (Steinert et al. 2006). The goal of this Viewpoint, which complements AMEE Guide 33, is to broaden our perspective and examine both formal and informal approaches to faculty development. Moreover, although the most common definitions of faculty development refer to a planned program to prepare institutions and faculty members for their academic roles (Bland et al. 1990), this Viewpoint asserts that faculty development can occur in a variety of contexts and settings, and often begins with informal learning in the workplace.

Figure 1 provides a pictorial description of how faculty development activities can move along in two dimensions: from individual (independent) experiences to group (collective) learning, and from informal approaches to more formal ones. (Steinert, in press) This paper will briefly examine what takes place in each quadrant and how we can take advantage of these opportunities. As the reader will note, mentorship has been placed in the center of the figure, as any strategy for self-improvement can benefit from the support and challenge that an effective mentor can provide.

Learning from experience

It has been said that medical educators become adept at what they do by "the nature of their job responsibilities" and "learning on the spot". (Steinert, 2008) Although this form of learning, which may occur in the classroom or in the clinical setting, is not often considered an approach to faculty development, it is vital to self-improvement. It can also be divided further into three categories: learning by doing; learning by observing; and learning by reflecting on experience.

Learning by doing is frequently described in the medical education literature as experiential learning. However, although it is highly valued as a form of learning in the clinical context, its benefits for the development of faculty members have not been described and merit further study. Learning by doing is also complemented by learning by observing. While the

AMEE GUIDE SUPPLEMENT 33.2 Viewpoint

Faculty development: Yesterday, today and tomorrow

Susan J. Lieff
University of Toronto

Medical school faculty members are charged with preparing the health professionals of the future for a rapidly changing healthcare environment and shifting societal and global issues. Attention to faculty development has become essential in order to assist faculty in developing and maintaining the necessary capabilities to meet our students' learning and development needs. AMEE Guide No. 33 is intended to assist those who are charged with supporting and developing faculty in meeting the education mission of an academic health science centre (McLean et al., 2008). This viewpoint article will complement the Guide by exploring some critical issues in the field, specifically:

1. That context is key; and
2. The need for engaged and outcomes driven curriculum design.

Context is key

The context for faculty development can be conceptualized from an internal and external perspective. Externally, the history of the field of faculty development, major trends and driving forces as well as future issues on the horizon all need to be considered in selecting an appropriate design and process for creating faculty development programs.

The field of faculty development is in its infancy with little in the way of empirical research that can inform recommendations regarding effective faculty development beyond satisfaction. It is, however, ripe with scholarly opportunity as increasingly program designs are informed by theories and attending to outcomes (Steinert et al., 2006). New programs and initiatives should attend to how they can position their scholarship in development and evaluation in order to further advance the field. Another evolution has been the recognition that faculty development can focus in a variety of areas beyond the instructional agenda and the need to develop based on what makes sense locally in terms of individual and institutional needs. As new initiatives always build on the story that precedes them, the history of the educational mission and faculty development in a faculty of medicine must be understood. Searching out these stories can help to inform regarding local beliefs, values and culture as well as existing strategies and who potential supporters might be. Appreciating the stories that live in the culture can enable faculty developers to appreciate where the energy for development lies as well as the feelings and issues that accompany any resistance. The utility of the Guide's recommendations to grow local expertise, bring in experts or collaborate with other medical education units, can then be appropriately situated.

Societal needs and healthcare practices, increased public accountability for the outcomes of medical education and trends in medical and higher education, such as globalization or commercialization, will continue to evolve and change. Faculty developers need to continuously scan their local and global environment and ask themselves: "What does

2010; 32: 425–428 MEDICAL TEACHER

AMEE GUIDE SUPPLEMENTS
FACULTY DEVELOPMENT: YESTERDAY, TODAY AND TOMORROW: GUIDE SUPPLEMENT 33.1 – VIEWPOINT[1]

Faculty development: From workshops to communities of practice

YVONNE STEINERT
Faculty Development Office and Centre for Medical Education, Faculty of Medicine, McGill University, Canada

> Participating in a faculty development workshop gives me a sense of community, self-awareness, motivation and validation of current practices and beliefs....
>
> Steinert (2008)

Introduction

Faculty development, or staff development as it is often called, has become an increasingly important component of medical education, and most medical schools now offer formal faculty development programmes and activities. As McLean et al. (2008) have stated in their recent AMEE Guide, 'with demands on medical faculties to be socially responsible and accountable, there is increasing pressure for the professionalization of teaching practice'.

To date, most faculty development initiatives described in the literature consist of formal (or structured) programmes such as workshops and seminars, longitudinal programmes and fellowships (Steinert et al. 2006). The goal of this viewpoint, which complements AMEE Guide no. 33, is to broaden our perspective and examine both formal and informal approaches to faculty development. Moreover, although the most common definitions of faculty development refer to a planned programme to prepare institutions and faculty members for their academic roles (Bland et al. 1990), this viewpoint asserts that faculty development can occur in a variety of contexts and settings, and often begins with informal learning in the workplace.

Figure 1 provides a pictorial description of how faculty development activities can move along two dimensions: from individual (independent) experiences to group (collective) learning, and from informal approaches to more formal ones (Steinert 2010). This article will briefly examine what takes place in each quadrant and how we can take advantage of these opportunities. As the reader will note, mentorship has been placed in the center of the figure, as any strategy for self-improvement can benefit from the support and challenge that an effective mentor can provide.

Learning from experience

It has been said that medical educators become adept at what they do by 'the nature of their job responsibilities' and 'learning on the spot' (Steinert 2008). Although this form of learning, which may occur in the classroom or in the clinical setting, is not often considered an approach to faculty development, it is vital to self-improvement. It can also be further divided into three categories: learning by doing; learning by observing; and learning by reflecting on experience (Steinert 2010).

Learning by doing is frequently described in the medical education literature as experiential learning. However, although it is highly valued as a form of learning in the clinical context, its benefits for the development of faculty members have not been described and merit further study. Learning by doing is also complemented by learning by observing. While the concept of role modelling has also been described in the acquisition of attitudes and skills by students and residents (Wright et al. 1997; Cruess et al. 2008), it is equally neglected in discussions about faculty development. However, all of us can remember how we learned from role models, even if we sometimes try to exhibit behaviours in opposition to what our role models have demonstrated. Clearly, teachers can actively and consciously seek out role models, observe them and learn from them, and we should work together to maximize this learning opportunity.

Reflecting on experience enhances both learning by doing and observing. Schön (1983) has described the importance of reflection in medicine and the key components of reflective practice that include 'reflection in action' (which includes an analysis of what is being done) and 'reflection on action' (which occurs after a particular action or situation has taken place). Lachman and Pawlina (2006) have added to this discussion by introducing the notion of 'reflection for action' (which includes reflecting on what has been learned for the future). Whatever the nomenclature, self-awareness, critical analysis, and the development of a new perspective are fundamental to the process of reflection, and we must identify the diverse ways in which this strategy can enhance the development of faculty members.

At times, keeping a log of teaching encounters or a journal can initiate the process of analysis and reflection. At other

Correspondence: Y. Steinert, Center for Medical Education, McGill University, 1110 Pine Avenue West, Montreal, QC H3A 1A3, Canada. Tel: 1 514 3982698; fax: 1 514 3986649; email: yvonne.steinert@mcgill.ca

ISSN 0142–159X print/ISSN 1466–187X online/10/050425–4 © 2010 Informa Healthcare Ltd.
DOI: 10.3109/01421590903776597

Medical Teacher

Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

AMEE Guide no. 34: teaching in the clinical environment

Subha Ramani [a]; Sam Leinster [b]
[a] Boston University School of Medicine, USA
[b] University of East Anglia, Norwich, UK

First Published: 2008

To cite this Article: Ramani, Subha and Leinster, Sam (2008) 'AMEE Guide no. 34: teaching in the clinical environment', Medical Teacher, 30:4, 347 — 364

To link to this article: DOI: 10.1080/01421590802061613
URL: http://dx.doi.org/10.1080/01421590802061613

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Continuing medical education: AMEE Education Guide No 35

Nancy Davis [a]; David Davis [b]; Ralph Bloch [c]
[a] National Institute for Quality Improvement and Education, Homestead, USA [b] University of Toronto, Canada [c] McMaster University, Canada

Online Publication Date: 01 January 2008

To cite this Article Davis, Nancy, Davis, David and Bloch, Ralph(2008)'Continuing medical education: AMEE Education Guide No 35',Medical Teacher,30:7,652 — 668
To link to this Article: DOI: 10.1080/01421590802108323
URL: http://dx.doi.org/10.1080/01421590802108323

2008; 30: 555–584 MEDICAL TEACHER

AMEE GUIDE NO 36

Faculty development: Yesterday, today and tomorrow

MICHELLE MCLEAN[1], FRANCOIS CILLIERS[2] & JACQUELINE M. VAN WYK[3]

[1]University of the United Arab Emirates, [2]University of Stellenbosch, South Africa, [3]University of KwaZulu-Natal, South Africa

Abstract

Medical education has evolved to become a discipline in its own right. With demands on medical faculties to be socially responsible and accountable, there is now increasing pressure for the professionalisation of teaching practice. Developing a cadre of professional and competent teachers, educators, researchers and leaders for their new roles and responsibilities in medical education requires faculty development. Faculty development is, however, not an easy task. It requires supportive institutional leadership, appropriate resource allocation and recognition for teaching excellence.

This guide is designed to assist those charged with preparing faculty for their many new roles in teaching and education in both medical and allied health science education. It provides a historical perspective of faculty development and draws on the medical, health science and higher education literature to provide a number of frameworks that may be useful for designing tailored faculty development programmes. These frameworks can be used by faculty developers to systematically plan, implement and evaluate their staff development programmes.

This guide concludes with some of the major trends and driving forces in medical education that we believe will shape future faculty development.

Introduction

What is faculty development? A historical perspective

At one time, anyone who graduated from medical school was considered capable of teaching. It became apparent, however, that teaching was not an innate gift. Besides content, teaching also involved 'process', and to develop the 'art' of teaching, academics required support (Benor 2000). So, began some of the first 'faculty development', also referred to in the literature as 'professional development' or 'staff development' (Guskey 2003, Steinert 2005). The purpose of this early 'teacher training' was generally to prepare academic faculty members for teaching, which was their primary responsibility at that time. As an academic's repertoire of responsibilities evolved to include research and administration, the concept of faculty development expanded, largely to strengthen the academic base of institutions (Bland & Stritter 1988; Hitchcock et al. 1993; Wilkerson & Irby 1998; Steinert 2000, 2005; Steinert et al. 2003; Harris et al. 2007). Sheets and Schwenk (1990) capture this in their definition of faculty development:

> "Any planned activity to improve an individual's knowledge and skills in areas considered essential to the performance of a faculty member in a department or a residency programme (e.g. teaching skills, administrative skills, research skills, clinical skills)".

Tables 1 and 2 reflect this evolving conception of faculty development. Table 1 is a chronological summary of some important contributions to academic development in medical education spanning more than three decades, while Table 2 summarizes the major trends and driving forces in medical education which we believe have influenced faculty development over the past thirty years.

The theories underpinning student learning have played a major role in the evolution of staff development (Table 2). For example, in line with the behaviourist theory in vogue

Practice points

- Faculty development is not a luxury. It is an imperative for every medical school.
- Sustainable faculty development requires a medical education unit/department staffed with respected faculty developers who are academic role models.
- Faculty development needs to be systematic, involving planning, implementation and evaluation.
- The outcomes of faculty development should be realistic and measurable (i.e. task-oriented).
- Faculty development should be tailored to suit the needs of individuals, disciplines and the institution.
- Activities used in faculty development programmes should encourage experiential learning and reflection (e.g. peer evaluation, portfolios).
- Faculty development should strive for collaboration across medical disciplines, and where possible, across professions.

Correspondence: Michelle McLean, Faculty of Medicine and Health Sciences, Department of Medical Education, Al Ain, United Arab Emirates. Tel: 0971 37137137; fax: 0971 37672167; email: mcleanm@uaeu.ac.ae

ISSN 0142–159X print/ISSN 1466–187X online/08/060555–30 © 2008 Informa UK Ltd.
DOI: 10.1080/01421590801993634

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Problem-based learning: Where are we now?

David Taylor [a]; Barbara Miflin [b]
[a] University of Liverpool, UK [b] University of Queensland, Australia

Online Publication Date: 01 January 2008

To cite this Article Taylor, David and Miflin, Barbara(2008)'Problem-based learning: Where are we now?',Medical Teacher,30:8,742 — 763
To link to this Article: DOI: 10.1080/01421590802217199
URL: http://dx.doi.org/10.1080/01421590802217199

2010; 32: 174–176 MEDICAL TEACHER

AMEE GUIDE SUPPLEMENTS

Setting and maintaining standards in multiple choice examinations: Guide supplement 37.1 – Viewpoint[1]

CEES VAN DER VLEUTEN
Maastricht University, The Netherlands

Some time ago, I wrote a paper about the assessment of competence in which I argued that any assessment situation is inevitably a compromise between what is desirable and what is achievable (Van der Vleuten 1996). There are no fixed and firm strategies that guarantee the perfect compromise. Things strongly depend on specific assessment contexts and local conditions. The challenge is to take a firm grasp of the assessment situation, including its psychometrics and other relevant factors, and then weigh these arguments and combine them into an informed compromise that one feels can be justified when challenged. I have no doubt that this same perspective applies to standard setting. In principle, with standard setting we have the technology to do a very good job indeed, although outcomes may vary considerably and some arbitrariness is inevitable. What needs to be considered, however, is how defensible procedures are and how much effort one is prepared to put into due process. How to do an excellent job on standard setting is admirably described in AMEE guide no. 37 (Bandaranayake 2008). A preference is expressed for the criterion-referenced approach, with a well-trained and preferably sizable panel of judges, who use one of several techniques to reach a collective judgment of the passing score. Although there is no gold standard for this approach, the (modified) Angoff method comes close. If one should wish to do an even better job, one can always turn to a compromise method that enables calibrating for test difficulty by taking account of panel outcomes as well as group performance data. A still better job can be done by calibrating test scales using test equating methods such as those described in the AMEE guide. One step further along the best practice road takes one to Item-Response Modelling for statistical equation (Downing 2003). Using these procedures one can estimate item and test difficulty independently of the ability of the group on which the estimates are based. In fact, such a calibrated bank of questions enables one to select items that best discriminate around the preselected standard, as is proposed in this Guide. Finally, the most sophisticated approach allows one to tailor test content to individual test takers' abilities. After a candidate has answered the first item, every next item is selected (by computer) in alignment with the candidate's performance on the previous items (tailored testing). And all this technology is available today! But what we need to ask here is: who can afford it? Yes, certification agencies around the world all have sufficient resources to make their professional standard setting practice nearly perfect. But what about the run-of-the-mill medical schools, or small colleges of specialty training? What can they do to raise the standards of their exams? Where should and can they compromise? Which valid arguments are suitable to underpin their 'informed' compromises?

In the AMEE guide, Raja Bandaranayake rightfully starts by explaining the concept of noise affecting any measurement. It is good measurement practice to aim for maximum noise reduction. I would argue that by far the biggest source of noise around standard setting is variation in test difficulty. A while ago, I carried out a variance component estimation on test data of 7 cohorts of medical students of Maastricht University (unpublished). Having calculated the average test result across all the course exams over 4 years of preclinical training, I was able to estimate variation not only across cohorts, but also across tests and even across examinees within tests, because variance component estimation allows one to express the contributions of these sources of variance relative to each other. The results of my experiment were interesting. Fortunately, the largest variance (82.60%) was attributable to variation between students, which is good, because after all the prime purpose of the entire assessment exercise is to discriminate between students. The second largest component was unexplained variance (12.42%) or general error. This is not surprising considering that general error is frequently the main variance component in any form of measurement. The third component was variation between tests (4.97%). Finally, explaining only 0.01% of the variance, the smallest component was the variance associated with cohort (cohort size varied between 150 and 200 examinees)! It is hard to compete with unexplained variance without further information on its sources, but test difficulty effects are much more impressive than cohort effects. During our continuous monitoring of progress testing, we have consistently observed a marked effect of test difficulty on group averages (Muijtjens et al. 2008), despite very rigorous quality assurance procedures around the construction of every test. An important implication

Correspondence: Prof. Cees Van der Vleuten, Universiteit Maastricht, Educational Development and Research, P.O. Box 616, Maastricht, 6200 MD, Netherlands. Tel: +31 43 3885725; fax: +31 43 3885779 email: c.vandervleuten@educ.unimaas.nl

ISSN 0142-159X print/ISSN 1466-187X online/10/020174-3 © 2010 Informa Healthcare Ltd.
DOI: 10.3109/01421590903505703

2008; 30: 836–845 MEDICAL TEACHER

AMEE GUIDE

Setting and maintaining standards in multiple choice examinations: AMEE Guide No. 37

RAJA C. BANDARANAYAKE

Abstract

The process of setting a standard when pass/fail decisions have to be made inevitably involves judgment about the point on the test score scale where performance is deemed to be adequate for the purpose for which the examination is set. As with any process which involves human judgment, setting this standard is likely to include a certain degree of error, which may result in some false positive and false negative decisions. The customary practice of maintaining a constant point on the test score scale at which pass/fail separations are made cannot be justified, as examinations vary in difficulty. The aim of standard setting procedures is to minimize such errors while accounting for the varying difficulty of examinations.

A standard may be norm-referenced, where it is dependent on the performance of the particular group of examinees, or criterion-referenced, where it is based on predetermined criteria, irrespective of examinee performance. Where certification of competence is the primary purpose of an examination, the latter is preferred as the decision to be made is whether an individual is competent to practise rather than competent compared to peers. Several methods of standard setting have been used, some of which are based solely on predetermined criteria, while others compromise between norm- and criterion-referenced standards.

This guide examines the more commonly used methods of standard setting, illustrates the procedure used in each with the help of an example, and discusses the advantages and disadvantages associated with the use of each. The common errors made by judges in the standard setting process are pointed out and the manner in which judges should be selected, trained and instructed emphasized. A method used for equating similar tests set at different times with the intention of maintaining standards from one examination to the next is illustrated with an example. Finally, the guide proposes a practical method for arriving at a predetermined standard by the proportionate selection of test-items of known relative difficulties in relation to minimally competent examinees.

Introduction

Simply stated, standard setting is the process of determining *how much is good enough*. In medical education the standard is intimately associated with the notion of competence. Competence, like all attributes, is measured along a scale, and is hence a continuous variable. The *standard*, or criterion level of performance, is a point on this scale at which a separation of competence and incompetence occurs. This is an artificial but necessary dichotomy imposed on the continuous variable. The terms *cut-score*, *cut-off score* and *passing score* are synonymous terms which represent this standard or criterion level on a given test for making decisions pertaining to the purpose for which the test was conducted, such as to certify competence.

Measurement on the scale of competence is associated with error. This error may arise from several sources, including the measuring instrument (test), measurer (examiner) or subject of measurement (examinee). The *true score* of an individual in a particular aspect of competence, say in Anatomy, is a conceptual measure indicating the true extent of competence that the individual possesses. The *observed score*, which the individual is assigned as a result of taking a test in Anatomy purporting to measure competence in this subject, has an

Practice points

- Standards set for examinations which certify competence should be criterion-referenced rather than norm-referenced.
- All standard setting methods involve judgment, with the possibility of false positive and false negative errors around the cut-off point
- The degree of error can be substantially reduced by the proper selection, training and monitoring of judges.
- While several standard setting methods are available, the Angoff method is the most popular, though the flexibility afforded by the Hofstee method, is more acceptable.
- Studies directed towards validation of the method used should be undertaken in the initial stages of its use, so that the method can be defended on scientific grounds.
- Standards can be maintained by test equating methods using "marker questions' from previous examinations to determine the relative difficulty of each examination".
- A practical procedure would be to specify the performance standard and develop a test to fit that standard, rather than apply a standard setting procedure to an existing test (Kane, 1994).

Correspondence: Raja C. Bandaranayake, 20 Strickland Street, Rose Bay, NSW, Australia 2029. Tel: +61-2-95717739; fax: +61-2-95717739; email: rajabanda@yahoo.com.au

ISSN 0142–159X print/ISSN 1466–187X online/08/09–100836–10 © 2008 Informa UK Ltd.
DOI: 10.1080/01421590802402247

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Learning in interprofessional teams: AMEE Guide no 38

Marilyn Hammick [a]; Lorna Olckers [b]; Charles Campion-Smith [c]
[a] Visiting Professor, Birmingham City University, [b] School of Public Health and Family Medicine at the University of Cape Town, South Africa [c] School of Health and Social Care at Bournemouth University, UK

Online Publication Date: 01 January 2009

To cite this Article Hammick, Marilyn, Olckers, Lorna and Campion-Smith, Charles(2009)'Learning in interprofessional teams: AMEE Guide no 38',Medical Teacher,31:1,1 — 12
To link to this Article: DOI: 10.1080/01421590802585561
URL: http://dx.doi.org/10.1080/01421590802585561

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Online eAssessment: AMEE Guide No. 39

Reg Dennick [a]; Simon Wilkinson [a]; Nigel Purcell [b]
[a] The University of Nottingham Medical School, UK [b] Higher Education Authority, Newcastle, UK

Online Publication Date: 01 March 2009

To cite this Article Dennick, Reg, Wilkinson, Simon and Purcell, Nigel(2009)'Online eAssessment: AMEE Guide No. 39',Medical Teacher,31:3,192 — 206
To link to this Article: DOI: 10.1080/01421590902792406
URL: http://dx.doi.org/10.1080/01421590902792406

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Online eAssessment: AMEE Guide No. 39

Reg Dennick [a]; Simon Wilkinson [a]; Nigel Purcell [b]
[a] The University of Nottingham Medical School, UK [b] Higher Education Authority, Newcastle, UK

Online Publication Date: 01 March 2009

To cite this Article Dennick, Reg, Wilkinson, Simon and Purcell, Nigel(2009)'Online eAssessment: AMEE Guide No. 39',Medical Teacher,31:3,192 — 206
To link to this Article: DOI: 10.1080/01421590902792406
URL: http://dx.doi.org/10.1080/01421590902792406

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Creating effective poster presentations: AMEE Guide no. 40

George R. Hess [a]; Kathryn W. Tosney [b]; Leon H. Liegel [c]
[a] North Carolina State University, USA [b] University of Miami, USA [c] Oregon State University, USA

Online Publication Date: 01 April 2009

To cite this Article Hess, George R., Tosney, Kathryn W. and Liegel, Leon H.(2009)'Creating effective poster presentations: AMEE Guide no. 40',Medical Teacher,31:4,319 — 321
To link to this Article: DOI: 10.1080/01421590902825131
URL: http://dx.doi.org/10.1080/01421590902825131

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

The place of anatomy in medical education: AMEE Guide no 41

Graham Louw [a]; Norman Eizenberg [b]; Stephen W. Carmichael [c]
[a] University of Cape Town, South Africa [b] Monash University, Australia [c] Mayo Clinic, USA

Online Publication Date: 01 May 2009

To cite this Article Louw, Graham, Eizenberg, Norman and Carmichael, Stephen W.(2009)'The place of anatomy in medical education: AMEE Guide no 41',Medical Teacher,31:5,373 — 386
To link to this Article: DOI: 10.1080/01421590902825149
URL: http://dx.doi.org/10.1080/01421590902825149

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

The place of anatomy in medical education: AMEE Guide no 41

Graham Louw [a]; Norman Eizenberg [b]; Stephen W. Carmichael [c]
[a] University of Cape Town, South Africa [b] Monash University, Australia [c] Mayo Clinic, USA

Online Publication Date: 01 May 2009

To cite this Article Louw, Graham, Eizenberg, Norman and Carmichael, Stephen W.(2009)'The place of anatomy in medical education: AMEE Guide no 41',Medical Teacher,31:5,373 — 386
To link to this Article: DOI: 10.1080/01421590902825149
URL: http://dx.doi.org/10.1080/01421590902825149

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

The use of simulated patients in medical education: AMEE Guide No 42

Jennifer A. Cleland [a]; Keiko Abe [b]; Jan-Joost Rethans [c]
[a] University of Aberdeen, UK [b] Gifu University, Japan [c] University of Maastricht, The Netherlands

Online Publication Date: 01 June 2009

To cite this Article Cleland, Jennifer A., Abe, Keiko and Rethans, Jan-Joost(2009)'The use of simulated patients in medical education: AMEE Guide No 42',Medical Teacher,31:6,477 — 486
To link to this Article: DOI: 10.1080/01421590903002821
URL: http://dx.doi.org/10.1080/01421590903002821

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Scholarship, publication, and career advancement in health professions education: AMEE Guide No. 43

William C. McGaghie *; Augusta Webster *
* Northwestern University Feinberg School of Medicine, USA

Online Publication Date: 01 July 2009

To cite this Article McGaghie, William C. and Webster, Augusta(2009)'Scholarship, publication, and career advancement in health professions education: AMEE Guide No. 43',Medical Teacher,31:7,574 — 590
To link to this Article: DOI: 10.1080/01421590903050366
URL: http://dx.doi.org/10.1080/01421590903050366

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

The use of reflection in medical education: AMEE Guide No. 44

John Sandars *
* The University of Leeds, UK

Online Publication Date: 01 August 2009

To cite this Article Sandars, John(2009)'The use of reflection in medical education: AMEE Guide No. 44',Medical Teacher,31:8,685 — 695
To link to this Article: DOI: 10.1080/01421590903050374
URL: http://dx.doi.org/10.1080/01421590903050374

Medical Teacher
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713438241

Portfolios for assessment and learning: AMEE Guide no. 45

Jan Van Tartwijk [a]; Erik W. Driessen [b]
[a] Leiden University, The Netherlands [b] University of Maastricht, The Netherlands

Online Publication Date: 01 September 2009

To cite this Article Van Tartwijk, Jan and Driessen, Erik W.(2009)'Portfolios for assessment and learning: AMEE Guide no. 45',Medical Teacher,31:9,790 — 801
To link to this Article: DOI: 10.1080/01421590903139201
URL: http://dx.doi.org/10.1080/01421590903139201

2012, e1–e11, Early Online MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Psychometric evaluation of a knowledge based examination using Rasch analysis: An illustrative guide: AMEE Guide No. 72

MOHSEN TAVAKOL & REG DENNICK
The University of Nottingham, UK

Abstract

Classical Test Theory has traditionally been used to carry out post-examination analysis of objective test data. It uses descriptive methods and aggregated data to help identify sources of measurement error and unreliability in a test, in order to minimise them. Item Response Theory (IRT), and in particular Rasch analysis, uses more complex methods to produce outputs that not only identify sources of measurement error and unreliability, but also identify the way item difficulty interacts with student ability. In this Guide, a knowledge-based test is analysed by the Rasch method to demonstrate the variety of useful outputs that can be provided. IRT provides a much deeper analysis giving a range of information on the behaviour of individual test items and individual students as well as the underlying constructs being examined. Graphical displays can be used to evaluate the ease or difficulty of items across the student ability range as well as providing a visual method for judging how well the difficulty of items on a test match student ability. By displaying data in this way, problem test items are more easily identified and modified allowing medical educators to iteratively move towards the 'perfect' test in which the distribution of item difficulty is mirrored by the distribution of student ability.

Introduction

The quality of assessment methods and processes is as important as the quality of the teaching and learning process in any form of educational activity. Undergraduate and postgraduate medical examination data needs to be evaluated using psychometric methods in order to understand, monitor, control and improve the quality of assessments. Medical educators and standard setters need to provide a stable and predictable measure of student performance over time to minimise sources of variation in examination data. The post-examination analysis of objective test data can provide the diagnostic feedback to not only improve the validity and reliability of assessments, but also improve curricula and teaching strategies (Tavakol & Dennick 2011b, 2012a, 2012b).

These analyses also allow for the identification of aberrant questions or individual skills assessment items (OSCE), which are outside of defined control limits and consequently could reduce the quality of the assessment questions (Wright & Stone 1979).

The importance of such analyses and their interpretations for improving student assessment are displayed in Table 1.

The purpose of this Guide is to generally explore in some detail the way that assessment scores can be affected by various influences and specifically how the use of Rasch analysis can aid in detecting these influences, in order that minimalisation will improve quality.

Practice points

- Rasch analysis is a particular method used in IRT.
- IRT supersedes CTT, in that it takes into consideration the interaction between student ability and item difficulty.
- The characteristics of a test that fits the Rasch model can be identified, so that test developers can iteratively move towards the 'perfect' test.
- The 'perfect' test is one on which the distribution of student ability is perfectly mirrored by the distribution of item difficulty.

Comparing Classical Test Theory with Item Response Theory

This section of the Guide describes and compares the concepts and methods that underpin Classical Test Theory (CTT), which is the more traditional approach to psychometric analysis, and Item Response Theory (IRT), which is a more developed and contemporary approach.

CTT is relatively easy to understand and has some useful techniques and outputs; by contrast IRT is conceptually more complex but produces a much more comprehensive analysis of an assessment, which takes into account both student and exam item behaviour. As this Guide attempts to explain, the

Correspondence: Professor Reg Dennick, Medical Education Unit, Medical School, University of Nottingham, Nottingham NG7 2UH, UK. Tel: 0044 (115) 823 0013; fax: 0044 (115) 823 0014; email: reg.dennick@nottinghgam.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/12/000001–11 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.737488

2013; 35: e849–e860

WEB PAPER
AMEE GUIDE

Looking back to move forward: Using history, discourse and text in medical education research: AMEE Guide No. 73

AYELET KUPER[1,2,3], CYNTHIA WHITEHEAD[3,4,5] & BRIAN DAVID HODGES[3,6,7]

[1]Sunnybrook Health Sciences Centre, [2]Department of Medicine, [3]The Wilson Centre, [4]Women's College Hospital, [5]Department of Family and Community Medicine, [6]Department of Psychiatry, [7]University Health Network, UHN/University of Toronto, all at the University of Toronto, Canada

Abstract

As medical education research continues to diversify methodologically and theoretically, medical education researchers have been increasingly willing to challenge taken-for-granted assumptions about the form, content and function of medical education. In this AMEE Guide we describe historical, discourse and text analysis approaches that can help researchers and educators question the inevitability of things that are currently seen as 'natural'. Why is such questioning important? By articulating our assumptions and interrogating the 'naturalness' of the *status quo*, one can then begin to ask *why* things are the way they are. Researchers can, for example, ask whether the models of medical education organization and delivery that currently seem 'natural' to them have been developed in order to provide the most benefit to students or patients – or whether they have, rather, been developed in ways that provide power to faculty members, medical schools or the medical profession as a whole. An understanding of the interplay of practices and power is a valuable tool for opening up the field to new possibilities for better medical education. The recognition that our current models, rather than being 'natural', were created in particular historical contexts for any number of contingent reasons leads inexorably to the possibility of change. For if our current ways of doing things are not, in fact, inevitable, not only can they be questioned, they can be made better; they can changed in ways that are attentive to whom they benefit, are congruent with our current beliefs about best practice and may lead to the production of better doctors.

> *Let us give the term genealogy to the union of erudite knowledge and local memories which allow us to establish a historical knowledge of struggles and to make use of this knowledge tactically today.*
>
> (Foucault 1980, p. 83)

Practice points

- Making meaningful change in medical education requires questioning taken for granted assumptions about what medical education currently is and what it should be.
- Historical, discourse and text analysis approaches, which are widely and successfully used outside medical education research, can enhance our field by helping us to 'make strange' things heretofore accepted as 'normal' or 'natural'.
- History is not a singular linear development towards progressive improvement but rather a fluid construction incorporating multiple contextual perspectives.
- Discourse analysis enables researchers to understand the effects and relations of language, practices and power in our current assumptions about medical education.
- Text analysis, while often used in conjunction with discourse analysis, can also be useful for conducting many other types of qualitative research.

Introduction

As medical educators we strive continually to improve the form and content of the education and training we provide for future physicians. While this is a noble aspiration, as a medical education community we are often limited in our ability to make meaningful change because we assume that large components of our current system are rational and inevitable. However, history shows us that the structures of medical education are instead arbitrary and contingent. Questioning the many things that we take for granted within medical education can give medical educators the freedom to re-imagine what medical education could be. Such questioning is often difficult because our ways of teaching and learning appear to be so natural that it is difficult for us to think that they could be undertaken in any other way.

We begin this AMEE Guide with an approach we call 'making strange'. This is a way of gaining new, even startling, perspectives about things that we would otherwise accept as 'normal', because they are so familiar, so engrained in routine, so naturalized, that it becomes difficult to imagine that the

Correspondence: A. Kuper, The Wilson Centre, University Health Network, University of Toronto, 200 Elizabeth Street, 1ES-565 Toronto, ON M5G 2C4, Canada. Tel: 416-480-5495; fax: 416-480-5977; email: ayelet948@post.harvard.edu

ISSN 0142–159X print/ISSN 1466–187X online/13/010849–12 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.749837

2013, 1–10, Early Online MEDICAL TEACHER

AMEE GUIDE

Script concordance testing: From theory to practice: AMEE Guide No. 75

STUART LUBARSKY[1], VALÉRIE DORY[2], PAUL DUGGAN[3], ROBERT GAGNON[4] & BERNARD CHARLIN[4]

[1]McGill University, Canada, [2]Universite catholique de Louvain, Belgium, [3]University of Adelaide, Australia, [4]University of Montreal, Canada

Abstract

The script concordance test (SCT) is used in health professions education to assess a specific facet of clinical reasoning competence: the ability to interpret medical information under conditions of uncertainty. Grounded in established theoretical models of knowledge organization and clinical reasoning, the SCT has three key design features: (1) respondents are faced with ill-defined clinical situations and must choose between several realistic options; (2) the response format reflects the way information is processed in challenging problem-solving situations; and (3) scoring takes into account the variability of responses of experts to clinical situations. SCT scores are meant to reflect how closely respondents' ability to interpret clinical data compares with that of experienced clinicians in a given knowledge domain. A substantial body of research supports the SCT's construct validity, reliability, and feasibility across a variety of health science disciplines, and across the spectrum of health professions education from pre-clinical training to continuing professional development. In practice, its performance as an assessment tool depends on careful item development and diligent panel selection. This guide, intended as a primer for the uninitiated in SCT, will cover the basic tenets, theoretical underpinnings, and construction principles governing script concordance testing.

Introduction

The script concordance test (SCT) is used in health professions education to assess a specific aspect of clinical reasoning competence: the ability to interpret medical information under conditions of uncertainty (Charlin et al. 1998). It has demonstrated favorable psychometric qualities (construct validity, reliability, and feasibility) in research conducted across a variety of health science disciplines (Llorca 2003; Cohen et al. 2005; Sibert et al. 2006; Ramaekers et al. 2010; Deschênes et al. 2011), and across the spectrum of health professions education from undergraduate (e.g. Humbert et al. 2011) through postgraduate (e.g. Meterissian 2006) and continuing professional development (Goulet et al. 2010). Its theoretical underpinnings, rooted in script theory from cognitive psychology, are the subject of ongoing scholarly inquiry (Kreiter 2012; Lubarsky et al. 2012). Procedures for diligent construction of SCTs have been developed (Fournier et al. 2008) and systematically reviewed (Dory et al. 2012).

This guide is intended for an audience of health professions educators who have little or no familiarity with script concordance testing or its underlying rationale. Its goal is to orient the reader toward the basic tenets, theoretical concepts, and construction principles governing script concordance testing. In the first part, a general overview of the script concordance approach will be provided. In the second part, the theoretical foundation of the test format will be discussed. In the third part, practical, evidence-based recommendations for test construction will be presented.

General overview: Test principles

Design features

The SCT is a written test for assessing reasoning under conditions of uncertainty. In an SCT, examinees are presented brief clinical scenarios, followed by a series of questions soliciting judgments about diagnostic possibilities or management options when new elements of information are provided. Although sufficient clinical context is given to allow meaningful decisions to be made, a certain amount of uncertainty, imprecision, or incompleteness is deliberately embedded in each case in order to simulate the ambiguous conditions that often characterize real-life clinical encounters.

In addition to its reliance on ill-defined clinical problems, the SCT has two other key design features. The first is that the response format reflects the way medical information is often processed in challenging problem-solving situations, according to established theoretical models of knowledge organization and clinical reasoning derived from cognitive psychology and medical education research. The second is that, in contrast to most conventional forms of assessment, there are no single correct answers to SCT questions. Instead, several responses to each of the test's questions may be considered acceptable, as determined independently by members of a reference panel of experienced clinicians selected from a given discipline or knowledge domain to set the test's scoring key.

Correspondence: S. Lubarsky, McGill Centre for Medical Education, McGill University, Lady Meredith House, 1110 Pine Avenue West, Montreal, QC H3A 1A3, Canada. Tel: 1 514 3983352; fax: 1 514 3987246; email: stuart.lubarsky@mcgill.ca

ISSN 0142–159X print/ISSN 1466–187X online/13/000001–10 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.760036

2013; 35: e1035–e1045 MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

The "problem" learner: Whose problem is it? AMEE Guide No. 76

YVONNE STEINERT
McGill University, Canada

Abstract

Clinical teachers often work with students or residents whom they perceive as a "problem". For some, it is a knowledge deficit that first alerts them to a problem; for others it is an attitudinal problem or distressing behaviour . And in some cases, it is difficult to know if the learner is, indeed, presenting with a problem. The goal of this Guide is to outline a framework for working with "problem" learners. This includes strategies for identifying and defining learners' problems, designing and implementing appropriate interventions, and assuring due process. The potential stress of medical school and residency training will also be addressed, as will a number of prevention strategies. Identifying learners' problems early – and providing guidance from the outset – can be an important investment in the training and development of future health professionals. It is hoped that this Guide will be of help to clinical teachers, program directors and faculty developers.

Introduction

Clinical teachers often work with students or residents whom they perceive as a "problem". For some, it is a knowledge deficit that first alerts them to a problem; for others it is an attitudinal problem or distressing behaviour (Steinert & Levitt 1993). And in some cases, it is difficult to know if the learner is, indeed, presenting with a problem. The goal of this Guide is to outline a framework for working with "problem" learners, which includes strategies for identifying and defining learners' problems, designing and implementing appropriate interventions, and assuring due process. The potential stress of medical school and residency training will also be addressed, as will a number of prevention strategies. Although some of the issues involved in teaching students and residents may differ (e.g. length of exposure to the learner; available methods of assessment), the principles for working with "problem" learners remain the same. Moreover, although many of the examples in the Guide come from working with students and residents in medical specialties, the approaches apply to learners in all of the health professions (e.g. Clark et al. 2008). Identifying learners' problems early – and providing guidance from the outset – can be an important investment in the training and development of future health professionals. It is hoped that this Guide, based on experiences in working with students and residents (Steinert & Levitt 1993; Steinert 2008) will be of help to clinical teachers, program directors, and faculty developers.

Practice points

- A framework for working with "problem" learners can help both teachers and learners alike.
- The "problem" may reside with the learner, the teacher and/or the system.
- Early identification and problem definition are essential ingredients to success.
- One-on-one discussions and observations of learners are key steps in problem identification.
- All contributing factors, including individual strengths and the stress of training, should be considered in problem definition and the design of the intervention.
- Interventions should be learner-centred and outcomes-based.
- Teachers should be supported by their colleagues and the system in their work with "problem" learners.

Definitions

A variety of terms have been used to describe the "problem" learner: the "*resident in difficulty*"; the "*troublesome learner*"; the "*disruptive student*"; and the "*impaired physician*" (Shapiro et al. 1987; Grams et al. 1992; Gordon 1993; Steinert et al. 2001; Yao & Wright 2001). The American Board of Internal Medicine (1999) has defined a "problem resident" as a "*trainee who demonstrates a significant enough problem that requires intervention by someone of authority, usually the program director or chief resident*", whereas Vaughn et al. (1998) have provided the following definition: "*a learner whose academic performance is significantly below performance potential because of a specific affective, cognitive, structural, or interpersonal difficulty*". The term has also been used to refer to impairment, secondary to emotional stress or substance abuse (Grams et al. 1992). This Guide will define a "problem" learner as a student or resident who

Correspondence: Yvonne Steinert, PhD, Centre for Medical Education, Faculty of Medicine, McGill University, 1110 Pine Avenue West, Montreal, Quebec H3A 1A3, Canada. Tel: 514-398-4988; fax: 514-398-6649; email: yvonne.steinert@mcgill.ca

ISSN 0142–159X print/ISSN 1466–187X online/13/041035–11 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.774082

2013; 35: e1103–e1122

WEB PAPER

Using databases in medical education research: AMEE Guide No. 77

JENNIFER CLELAND, NEIL SCOTT, KIRSTEN HARRILD & MANDY MOFFAT
University of Aberdeen, UK

Abstract

This AMEE Guide offers an introduction to the use of databases in medical education research. It is intended for those who are contemplating conducting research in medical education but are new to the field. The Guide is structured around the process of planning your research so that data collection, management and analysis are appropriate for the research question. Throughout we consider contextual possibilities and constraints to educational research using databases, such as the resources available, and provide concrete examples of medical education research to illustrate many points. The first section of the Guide explains the difference between different types of data and classifying data, and addresses the rationale for research using databases in medical education. We explain the difference between qualitative research and qualitative data, the difference between categorical and quantitative data, and the difference types of data which fall into these categories. The Guide reviews the strengths and weaknesses of qualitative and quantitative research. The next section is structured around how to work with quantitative and qualitative databases and provides guidance on the many practicalities of setting up a database. This includes how to organise your database, including anonymising data and coding, as well as preparing and describing your data so it is ready for analysis. The critical matter of the ethics of using databases in medical educational research, including using routinely collected data versus data collected for research purposes, and issues of confidentiality, is discussed. Core to the Guide is drawing out the similarities and differences in working with different types of data and different types of databases. Future AMEE Guides in the research series will address statistical analysis of data in more detail.

Introduction

We are surrounded by data (facts) wherever we go. In our lives we constantly take in data from our environment, interpret and make sense of this and store relevant pieces of information for the future. Too much data can, however, lead to information overload and there is a limit to how much useful information an individual can effectively store and retrieve. This means that data need to be recorded more permanently for future reference. This is not new. Five thousand years ago as more complex societies developed, the need for accurate bureaucratic records led to an organised system of records on clay tablets. Other societies recorded information using stone, papyrus, paper or even knotted string and many employed scribes to record and interpret important data.

Such stored information is only useful if organised in such a way that it can be retrieved quickly. A database is just an organised collection of data for storing, managing and retrieving information. The term originates from the development of computing in the 1960s, but a database does not necessarily need to be in digital form. A filing cabinet or card box to store records in alphabetical order could be considered a database, as it is simply a means of storing data and is designed to enable fast access to such information (see Picture 1 for an example of a paper-based database).

An electronic database can be even more powerful than a paper-based database – not only can it store large amount of data, it can also sort and order data in convenient ways and establish connections and patterns between related records. For example, using a paper database you cannot quickly sort records by age, find the oldest or youngest person or find everyone born on a particular day. Using an electronic

Practice points

- A database is a tool for storing, managing and retrieving data, so it can be interpreted and used for various (in this case, for medical education research) purposes.
- Databases can be used to manage and analyse numerical and word-based data from quantitative and qualitative research projects.
- Deciding the nature of your research, understanding the nature of your data and how to classify data types are crucial to setting up your database.
- Practical considerations such as cost, available resources and support usually need to be taken into consideration, as well as the data management and analysis requirements of the project.
- Be aware of the local ethics requirements and international guidance for carrying out medical education research, and adhere to these. Being able to show how you addressed any issues of risk will help if you want to publish your work in a journal.

Correspondence: Professor J. Cleland, Division of Medical and Dental Education, University of Aberdeen, Foresterhill, Aberdeen AB25 2AZ, UK. Tel: 01224 437257; fax: 01224 437285; email: jen.cleland@abdn.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/13/051103–20 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.788632

2013; 35: e1197–e1210

WEB PAPER
AMEE GUIDE

Frameworks for learner assessment in medicine: AMEE Guide No. 78

LOUIS PANGARO[1] & OLLE TEN CATE[2]

[1]Uniformed Services University of the Health Sciences, USA, [2]University Medical Center, Utrecht, the Netherlands

Abstract

In any evaluation system of medical trainees there is an underlying set of assumptions about what is to be evaluated (i.e., which goals reflect the values of the system or institution), what kind of observations or assessments are useful to allow judgments[1]; and how these are to be analyzed and compared to a standard of what is to be achieved by the learner. These assumptions can be conventionalized into a framework for evaluation. Frameworks encompass, or "frame," a group of ideas or categories to reflect the educational goals against which a trainee's level of competence or progress is gauged. Different frameworks provide different ways of looking at the practice of medicine and have different purposes. In the first place, frameworks should enable educators to determine to what extent trainees are ready for advancement, that is, whether the desired competence has been attained. They should provide both a valid mental model of competence and also terms to describe successful performance, either at the end of training or as milestones during the curriculum. Consequently, such frameworks drive learning by providing learners with a guide for what is expected. Frameworks should also enhance consistency and reliability of ratings across staff and settings. Finally, they determine the content of, and resources needed for, rater training to achieve consistency of use. This is especially important in clinical rotations, in which reliable assessments have been most difficult to achieve. Because the limitations of workplace-based assessment have persisted despite the use of traditional frameworks (such as those based on knowledge, skills, and attitudes), this Guide will explore the assumptions and characteristics of traditional and newer frameworks. In this AMEE Guide, we make a distinction between analytic, synthetic, and developmental frameworks. Analytic frameworks deconstruct competence into individual pieces, to evaluate each separately. Synthetic frameworks attempt to view competence holistically, focusing evaluation on the performance in real-world activities. Developmental frameworks focus on stages of, or milestones, in the progression toward competence. Most frameworks have one predominant perspective; some have a hybrid nature.

The importance of frameworks

Imagine yourself being a clinical specialist, recently appointed as a training director for a clerkship or clinical attachment at a teaching hospital. Students and residents will all visit your department for clinical training. Your institution has asked you to have your faculty evaluate them at the end of their rotations and to report a valid mark for each. Here is where you find yourself somewhat uncomfortable. Teaching is your passion, but assessing students has simply not been easy for you as a teacher, and overseeing the assessments of your fellow teachers seems very complicated. The students' school and the residents' program each have their own assessment forms and frameworks for evaluation, and you have trouble understanding these yourself. Explaining it to others and overseeing their evaluations may expose your own lack of experience with educational principles. Students and residents are usually perceived by you and your clinical colleagues as likeable and they "deserve to pass" but grading them on a scale does not make much sense to you. You yourself like giving all learners "above expectations" marks, because students clearly seem to do their best. You worry that all grading is subjective in any case, and do not feel you know how to get "objective" evaluations from your colleagues. Where can you get help?

A consideration of educational frameworks, as this Guide provides, can help you be more clear in your own thinking, and in communicating expectations to your students and

Practice points

- Frameworks scaffold teachers and students in education, learning, and assessment, and reflect vocabulary for communication about education.
- Frameworks may be described as analytic (e.g., knowledge, skills attitudes), synthetic (e.g., focused on clinical activities), and developmental (e.g., beginner, competent, expert) and often have a hybrid nature.
- Frameworks differ in their ease of use and acceptability. Secondary effects of frameworks include the resources needed to achieve consistent use. Effective frameworks need to be simple enough to be remembered.
- Frameworks are a necessary but not sufficient prerequisite to arrive at valid decisions about progress or certification of learners.

Correspondence: Professor L. Pangaro, Department of Medicine, F. Edward Hebert School of Medicine, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814-4799, USA. Tel: 301 295 2010; fax: 301 295 - 5792; email: louispangaro@aol.com

ISSN 0142–159X print/ISSN 1466–187X online/13/061197–14 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.788789

2013, 1–35, Early Online MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Personality assessments and outcomes in medical education and the practice of medicine: AMEE Guide No. 79

MOHAMMADREZA HOJAT, JAMES B. ERDMANN & JOSEPH S. GONNELLA
Jefferson Medical College of Thomas Jefferson University, USA

Abstract

In a paradigm of physician performance we propose that both "cognitive" and "noncognitive" components contribute to the performance of physicians-in-training and in-practice. Our review of the relevant literature indicates that personality, as an important factor of the "noncognitive" component, plays a significant role in academic and professional performances. We describe findings on 14 selected personality instruments in predicting academic and professional performances. We question the contention that personality can be validly and reliably assessed from admission interviews, letters of recommendation, essays, and personal statements. Based on conceptual relevance and currently available empirical evidence, we propose that personality attributes such as conscientiousness and empathy should be considered among the measures of choice for the assessment of pertinent aspects of personality in academic and professional performance. Further exploration is needed to search for additional personality attributes pertinent to medical education and patient care. Implications for career counseling, assessments of professional development and medical education outcomes, and potential use as supplementary information for admission decisions are discussed.

"In the physician or surgeon no quality takes rank with imperturbability [which] means coolness and presence of mind under all circumstances and the physician who has the misfortune to be without it loses rapidly the confidence of his patient."

Sir William Osler, 1922, pp. 3–4

Introduction

Considering the notion of professionalism in medicine, it is increasingly acknowledged that at least two major complementary components contribute to the performances of physicians-in-training and in-practice. One component includes a set of "cognitive" abilities, which are often reflected in intellectual capabilities, performances on examinations of recalling factual information and tests of declarative knowledge. The other component, often described under the rubric of "noncognitive" or personal qualities, includes features such as personality attributes, attitudes, interests, values and other personal characteristics (Gonnella et al. 1993, 1998). The "imperturbability" attribute, described in the opening epigraph, reflects a noncognitive personal quality of a physician that, according to Sir William Osler, is associated with patient outcomes.

Despite the acknowledgement of the contribution of "noncognitive" qualities to predicting performance, career interest, and clinical outcomes (Gonnella et al. 1993, 1998), the assessment and development of personal qualities in general, and personality attributes in particular, have not received appropriate attention in medical education research. A recent interest in the development and assessment of "professionalism" in medicine (Stern 2006) has, to a certain extent, shifted the attention of medical education leaders, faculty, and researchers toward assessing and cultivating personality attributes relevant to the notion of professionalism in medicine (Veloski & Hojat 2006).

The "noncognitive" dimension of performance includes vast and diverse arrays of personality, social and cultural variables. A comprehensive treatment of all these "noncognitive" variables is beyond the intended scope of this Guide. Thus, for a more manageable and parsimonious presentation, in this Guide we will attempt to focus on those selected personality attributes that have been empirically studied in medical education research.

Personality in the context of medical education and patient care

In the context of medical education and patient care, we define personality as a configuration of characteristics and behavioral tendencies that comprise an individual's unique features, developed based on a combination of several interacting elements such as constitutional predisposition, rearing environment, quality of early attachment relationships, interpersonal and critical life event experiences, social and cultural environment as well as formal and informal education. The aforementioned conceptualization is consistent with the

Correspondence: Mohammadreza Hojat, PhD, Center for Research in Medical Education and Health Care, Jefferson Medical College of Thomas Jefferson University, Philadelphia, PA 19107, USA. Tel: +215-955-9459; fax: +215-923-6939; email: mohammadreza.hojat@jefferson.edu

ISSN 0142–159X print/ISSN 1466–187X online/13/000001–35 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.788654

2013; 35: e1365–e1379

WEB PAPER
AMEE GUIDE

Ethnography in qualitative educational research: AMEE Guide No. 80

SCOTT REEVES[1], JENNIFER PELLER[2], JOANNE GOLDMAN[2] & SIMON KITTO[2]
[1]University of California, USA, [2]University of Toronto, Canada

Abstract

Ethnography is a type of qualitative research that gathers observations, interviews and documentary data to produce detailed and comprehensive accounts of different social phenomena. The use of ethnographic research in medical education has produced a number of insightful accounts into its role, functions and difficulties in the preparation of medical students for clinical practice. This AMEE Guide offers an introduction to ethnography – its history, its differing forms, its role in medical education and its practical application. Specifically, the Guide initially outlines the main characteristics of ethnography: describing its origins, outlining its varying forms and discussing its use of theory. It also explores the role, contribution and limitations of ethnographic work undertaken in a medical education context. In addition, the Guide goes on to offer a range of ideas, methods, tools and techniques needed to undertake an ethnographic study. In doing so it discusses its conceptual, methodological, ethical and practice challenges (e.g. demands of recording the complexity of social action, the unpredictability of data collection activities). Finally, the Guide provides a series of final thoughts and ideas for future engagement with ethnography in medical education. This Guide is aimed for those interested in understanding ethnography to develop their evaluative skills when reading such work. It is also aimed at those interested in considering the use of ethnographic methods in their own research work.

Introduction

Over the past decade or so, we have witnessed a sustained growth in the use of qualitative methods in health professions education and health services research. This expansion of qualitative research has provided a range of insightful accounts of the factors that influence the development and delivery of medical education across the globe. However, as much of this qualitative work has focused on the collection of interviews (individual interviews, focus groups) to generate evidence, the result has been the creation of a largely *perceptional* account of what students, faculty and administrators think about medical education, rather than data of *what actually happens* in this domain.

Ethnography offers a way forward here, to help overcome these limitations of relying solely on interview data. Through the collection of observations, interviews and documentary data, which are triangulated (i.e. compared and contrasted with one another) ethnographic research offers a qualitative approach with the potential to yield detailed and comprehensive accounts of different social phenomenon (actions, behaviour, interactions, beliefs). Through its use of *in situ* observations ethnographers can 'immerse' themselves in a social setting, thereby generating a rich understanding of social action. Participant observation also provides ethnographers an opportunity to gather empirical insights into social practices which are normally 'hidden' from the public gaze. Additionally, since it aims to generate holistic social accounts, ethnographic research can identify, explore and link social phenomena which, on the surface, have little connection with each other. As such, ethnographic research differs from other forms of qualitative research such as phenomenology (the analysis of interviews to understand individual's lived experiences) or discourse analysis (the analysis of talk and/or documents to understand the influence of embedded discourses).

Due to this complexity, unlike many other forms of qualitative research, ethnographic research is more difficult to undertake. For example, due to the need to spend relatively

Practice points

- With its origins in anthropology, ethnography is the study of social interactions, behaviours and perceptions that occur within groups, organisations and communities
- Ethnography has an underlying research methodology and an associated toolbox of methods (participant observations, interviews, documents) which shape both and generate detailed understanding of the social action
- Ethnographers employ a number of key techniques (e.g. thick description, reflexivity, triangulation) to enhance the quality of their work
- Ethnographic research has generated a number of insightful accounts into the development and delivery of medical education

Correspondence: Scott Reeves, Center for Innovation in Interprofessional Education, University of California, 520 Parnassus Avenue, C112 San Francisco, CA 94143, USA. Tel: 415 476 5134; fax: 415 476 9690; email: scott.reeves@ucsf.edu

ISSN 0142–159X print/ISSN 1466–187X online/13/081365–15 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.804977

2011; 33: 6–8 MEDICAL TEACHER

AMEE GUIDE

Communication skills: An essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51[1]

ANITA LAIDLAW[1] & JO HART[2]

[1]University of St Andrews, UK, [2]University of Manchester, UK

Abstract

This AMEE Guide in Medical Education is Part 1 of a two part Guide covering the issues of Communication. This Guide has been written to provide guidance for those involved in planning the assessment of clinical communication and provides guidance and information relating to the assessment of various aspects of clinical communication; its underlying theory; its practical ability to show that an individual is competent and its relationship to students' daily performance. The advantages and disadvantages of assessing specific aspects of communication are also discussed.

The Guide draws attention to the complexity of assessing the ability to communicate with patients and healthcare professionals, with issues of reliability and validity being highlighted for each aspect. Current debates within the area of clinical communication teaching are raised: when should the assessment of clinical communication occur in undergraduate medical education?, should clinical communication assessment be integrated with clinical skills assessment, or should the two be separate?, how important should the assessment of clinical communication be, and the question of possible failure of students if they are judged not competent in communication skills?

It is the aim of the authors not only to provide a useful reference for those starting to develop their assessment processes, but also provide an opportunity for review and debate amongst those who already assess clinical communication within their curricula, and a resource for those who have a general interest in medical education who wish to learn more about communication skills assessment.

Introduction

What is clinical communication?

In its broadest sense it would be any communication between health professionals or between health professionals and patients (and relatives). This communication could be written or oral, face to face, telephonic, electronic or via video transmission. The subject matter may range from a brief upper respiratory infection to terminal cancer (von Fragstein et al. 2008). However what is always true, is how it is performed is important, since effective doctor–patient communication has been linked with improvements in patient satisfaction (Williams et al. 1998), adherence to treatment regimens (DiMatteo 2004) and patient health outcomes (Stewart 1995).

Given the importance of clinical communication, is it something that doctors are good at?

Several studies show that a large proportion of complaints against doctors arise from problems or difficulties in

Practice points

- Communication skills are an essential component of health sciences undergraduate curricula.
- When considering how to assess clinical communication, it is important to determine what the elements that need to be assessed are.
- Assessment may be made easier through the use of accepted models of skills development.
- Specific areas for consideration are: resource allocation; validity, reliability and generalisability; timing of assessment activities; confidence in the chosen methods and the importance of the results obtained.
- There are a number of areas of clinical communication assessment under current debate such as its integration into standard assessment activities.
- Many of the topics within the assessment of clinical communication are currently being researched, suggesting that it is still an important growth area.

Correspondence J. Hart, Manchester Medical School, University of Manchester, Stopford Building, Oxford Road, Manchester, M13 9PT, UK. Tel: 0161 275 1845; fax: +44 (0) 161 275 5584; email: jo.hart@manchester.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/11/010006-3 © 2011 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.531170

2011; 33: 188–199 MEDICAL TEACHER

AMEE GUIDE

Situativity theory: A perspective on how participants and the environment can interact: AMEE Guide no. 52

STEVEN J. DURNING & ANTHONY R. ARTINO
Uniformed Services University of the Health Sciences, USA

Abstract

Situativity theory refers to theoretical frameworks which argue that knowledge, thinking, and learning are situated (or located) in experience. The importance of context to these theories is paramount, including the unique contribution of the environment to knowledge, thinking, and learning; indeed, they argue that knowledge, thinking, and learning cannot be separated from (they are dependent upon) context. Situativity theory includes situated cognition, situated learning, ecological psychology, and distributed cognition. In this Guide, we first outline key tenets of situativity theory and then compare situativity theory to information processing theory; we suspect that the reader may be quite familiar with the latter, which has prevailed in medical education research. Contrasting situativity theory with information processing theory also serves to highlight some unique potential contributions of situativity theory to work in medical education. Further, we discuss each of these situativity theories and then relate the theories to the clinical context. Examples and illustrations for each of the theories are used throughout. We will conclude with some potential considerations for future exploration. Some implications of situativity theory include: a new way of approaching knowledge and how experience and the environment impact knowledge, thinking, and learning; recognizing that the situativity framework can be a useful tool to "diagnose" the teaching or clinical event; the notion that increasing individual responsibility and participation in a community (i.e., increasing "belonging") is essential to learning; understanding that the teaching and clinical environment can be complex (i.e., non-linear and multi-level); recognizing that explicit attention to how participants in a group interact with each other (not only with the teacher) and how the associated learning artifacts, such as computers, can meaningfully impact learning.

Introduction

A number of theories can be broadly classified into situativity theory. Situated cognition or "SitCog" is perhaps the best example, but others include ecological psychology or "Ecopsych" and distributed cognition. In this Guide, we will cover these theories with an emphasis on situated cognition and ecological psychology.

Situativity theory proposes a number of important implications as outlined in the abstract. This Guide will provide a brief historical perspective and then discuss specific situativity theories (situated cognition, situated learning, ecological psychology, and distributed cognition). We will then discuss the theories applied to the practice of medical education and will follow up with a discussion of potential future directions and implications. We use a number of illustrative examples throughout. Because the typical medical educator is familiar with (and often embraces) information processing theory, we will begin with briefly comparing and contrasting situativity theory with information processing theory.

Situativity theory versus information processing theory

Situativity theory evolved from cognitive psychology. The prominent tenet of situativity theory is the perspective that knowledge and thinking (cognition; i.e., situated cognition), as well as learning (i.e., situated learning), are situated in experience. Experience includes the participants (i.e., students, teachers, and patients), the culture, and the physical environment where thinking and learning occur. Stated another way, situativity theory stresses the social nature of cognition, meaning, and learning, with emphasis on the importance of the participants and the environment, as well as the *evolving interaction* between the participants and the environment within which thinking and learning occur.

Situativity theory proposes a model for dealing with knowledge, thinking, and learning that is fundamentally social and cultural (i.e., it is "situated"). Examples to illustrate situativity include playing Scrabble™ or writing a manuscript with a colleague. Knowledge, thinking (cognition), and

Correspondence: S.J. Durning, Department of Medicine and Pathology, Uniformed Services University of the Health Sciences, Bethesda, MD 20814, USA. Tel: 1 301-295-3602; fax: 1 301-295-3557; email: sdurning@usuhs.mil

ISSN 0142-159X print/ISSN 1466-187X online/11/030188–12
DOI: 10.3109/0142159X.2011.550965

2011; 33: 518–529 MEDICAL TEACHER

AMEE GUIDE

Developing a medical school: Expansion of medical student capacity in new locations: AMEE Guide No. 55[1]

DAVID SNADDEN[1], JOANNA BATES[1], PHILIP BURNS[2], OSCAR CASIRO[1], RICHARD HAYS[3], DAN HUNT[4] & ANGELA TOWLE[1]

[1]University of British Columbia, Canada, [2]University of Manchester, UK, [3]Bond University, Australia, [4]Association of American Medical Colleges, Washington DC, USA

Abstract

Background: A concern about an impending shortage of physicians and a worry about the continued maldistribution of physicians to medically underserved areas have encouraged the expansion of medical school training places in many countries, either by the creation of new medical schools or by the creation of regional campuses.

Aims: In this Guide, the authors, who have helped create new regional campuses and medical schools in Australia, Canada, UK, USA, and Thailand share their experiences, triumphs, and tribulations, both from the views of the regional campus and from the views of the main Medical School campus. While this Guide is written from the perspective of building new regional campuses of existing medical schools, many of the lessons are applicable to new medical schools in any country of the world. Many countries in all regions of the world are facing rapid expansion of medical training facilities and we hope this Guide provides ideas to all who are contemplating or engaged in expanding medical school training places, no matter where they are.

Description: This Guide comprises four sections: planning, getting going; pitfalls to avoid; and maturing and sustaining beyond the first years. While the context of expanding medical schools may vary in terms of infrastructure, resources, and access to technology, many themes, such as developing local support, recruiting local and academic faculty, building relationships, and managing change and conflict in rapidly changing environments are universal themes facing every medical academic development no matter where it is geographically situated.

Further information: The full AMEE Guide, printed separately, in addition contains case examples from the authors' experiences of successes and challenges they have faced.

Expansion of medical student capacity in new locations

The intention of this Guide is to advise on how to set up additional, functionally separate campuses for the education of undergraduate medical students. Many of the themes described may, however, be applicable to setting up new independent medical schools. While this Guide is written from the perspective of developing campuses in Australia, Canada, the UK, and the USA, we are aware that there are rapid expansions of medical training in many countries of the world, and while the setting and availability of resources may vary, the main themes we describe have universal applicability in many settings.

By a functionally separate campus, we mean a geographically distinct medical education program where, by reason of the amount of time spent there by students or because of geographical distance, the campus must provide support services for students including its own senior leadership, faculty, administration and student services. The campus may be affiliated with an established university and medical school, with a local university that does not operate a medical school, or

Practice points

- When considering the planning and development of new medical education facilities make sure "the vision" is shared locally and the potential benefits understood.
- Build and continually renew relationships across campuses and with communities. This is not only a factor for success, but important for future sustainability.
- Test things out if you can. A "prototypical week" where students and faculty from an existing campus spend a week in a new setting is a great opportunity for new faculty to safely experience what will be expected of them and to test out potential technology.
- Clinical education is mostly delivered by practicing physicians; remember that they may have learned medicine in a different system, or by different methods. Effective faculty development, (teaching the teachers) is therefore critical to success.
- Do not underestimate the need for student support at the new site, not just in terms of personal and academic support, but also in terms of finding accommodation and developing a student culture in the new environment.

Correspondence: D. Snadden, UNBC, Northern Medical Program, 3333 University Way, Prince George, British Columbia, V2N 4Z9, Canada. Tel: 250 960 6172; fax: 250 960 5518; email: snadden@unbc.ca

ISSN 0142–159X print/ISSN 1466–187X online/11/070518–12 © 2011 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.594681

2011; 33: 695–709 MEDICAL TEACHER

AMEE GUIDE

'The research compass': An introduction to research in medical education: AMEE Guide No. 56

CHARLOTTE RINGSTED[1], BRIAN HODGES[2] & ALBERT SCHERPBIER[3]

[1]University of Copenhagen and Capital Region, Denmark, [2]University of Toronto, Canada, [3]University of Maastricht, Netherlands

Abstract

This AMEE Guide offers an introduction to research in medical education. It is intended for those who are contemplating conducting research in medical education but are new to the field. The Guide is structured around the process of transforming ideas and problems into researchable questions, choosing a research approach that is appropriate to the purpose of the study and considering the individual researcher's preferences and the contextual possibilities and constraints. The first section of the Guide addresses the rationale for research in medical education and some of the challenges posed by the complexity of the field. Next is a section on how to move from an idea or problem to a research question by placing a concrete idea or problem within a conceptual, theoretical framework. The following sections are structured around an overview model of approaches to medical education research, 'The research compass'. Core to the model is the conceptual, theoretical framework that is the key to any direction. The compass depicts four main categories of research approaches that can be applied when studying medical education phenomena, 'Explorative studies'; 'Experimental studies'; 'Observational studies'; and 'Translational studies'. Future AMEE Guides in the research series will address these approaches in more detail.

Introduction

This AMEE Guide offers an introduction to research in medical education. It is intended for those who are contemplating conducting research in medical education but are new to the field. This includes those who are generally inexperienced in research as well as those who have previous research experience in the biomedical, but not in the medical education, domain. It is with those readers in mind that we will draw some parallels with research in biomedicine, and indicate where and how research in medical education is similar or different. In addition to some overall principles, the Guide will address the current debate about approaches to medical education research and the study of complex phenomena and interventions. Hence, the Guide we hope may also be of interest to those who already have some experience in research in medical education, and promote future discussion.

The Guide is structured around the process of transforming ideas and problems into researchable questions, choosing a research approach that is appropriate to the purpose of the study and considering the individual researcher's preferences and the contextual possibilities and constraints. The first section of the guide addresses the rationale for doing research in medical education and some of the challenges posed by the complexity of the field. Next is a section on how to move from idea or problem to a research question. This section describes specifically how to place a concrete idea or problem within a

Practice points

- Research in medical education seeks to deepen the knowledge and understanding of learning, teaching and education. It is neither about solving concrete, local problems nor about providing general, universal solutions.
- To get from idea, problem or phenomenon of interest to a research question, it is necessary to have a conceptual, theoretical framework for the study: identify underlying theories of mechanisms and principles of learning, teaching or education pertaining to the topic and search the literature for 'what is already known' and 'what needs to be investigated further'.
- Research is about taking small steps, making choices and sacrifices in order to focus the topic of inquiry and formulate a general, researchable question.
- There are many research approaches to choose among, each having its own purpose. Four main categories are: Explorative studies aiming at modelling; experimental studies aiming at justifying; observational studies aiming at predicting; and translational studies aiming at implementing.
- The choice of research approach depends on the research question, and often more than one type or mixed approaches are both feasible and necessary.

Correspondence: C. Ringsted, Centre for Clinical Education, University of Copenhagen and Capital Region, Rigshospitalet, 5404, Blegdamsvej 9, 2100 Copenhagen, Denmark. Tel: 45 35455424; fax: 45 35454437; email: charlotte.ringsted@rh.regionh.dk

ISSN 0142–159X print/ISSN 1466–187X online/11/090695–15 © 2011 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.595436

2011; 33: 783–797 MEDICAL TEACHER

AMEE GUIDE

General overview of the theories used in assessment: AMEE Guide No. 57

LAMBERT W. T. SCHUWIRTH[1] & CEES P. M. VAN DER VLEUTEN[2]

[1]Flinders University, Australia, [2]Maastricht University, The Netherlands

Abstract

There are no scientific theories that are uniquely related to assessment in medical education. There are many theories in adjacent fields, however, that can be informative for assessment in medical education, and in the recent decades they have proven their value. In this AMEE Guide we discuss theories on expertise development and psychometric theories, and the relatively young and emerging framework of assessment for learning. Expertise theories highlight the multistage processes involved. The transition from novice to expert is characterised by an increase in the aggregation of concepts from isolated facts, through semantic networks to illness scripts and instance scripts. The latter two stages enable the expert to recognise the problem quickly and form a quick and accurate representation of the problem in his/her working memory. Striking differences between experts and novices is not *per se* the possession of more explicit knowledge but the superior organisation of knowledge in his/her brain and pairing it with multiple real experiences, enabling not only better problem solving but also more efficient problem solving. Psychometric theories focus on the validity of the assessment – does it measure what it purports to measure and reliability – are the outcomes of the assessment reproducible. Validity is currently seen as building a train of arguments of how best observations of behaviour (answering a multiple-choice question is also a behaviour) can be translated into scores and how these can be used at the end to make inferences about the construct of interest. Reliability theories can be categorised into classical test theory, generalisability theory and item response theory. All three approaches have specific advantages and disadvantages and different areas of application. Finally in the Guide, we discuss the phenomenon of assessment *for* learning as opposed to assessment *of* learning and its implications for current and future development and research.

Introduction

It is our observation that when the subject of assessment in medical education is raised, it is often the start of extensive discussions. Apparently, assessment is high on everyone's agenda. This is not surprising because assessment is seen as an important part of education in the sense that it not only defines the quality of our students and our educational processes, but it is also seen as a major factor in steering the learning and behaviour of our students and faculty.

Arguments and debates on assessment, however, are often strongly based on tradition and intuition. It is not necessarily a bad thing to heed tradition. George Santayana already stated (quoting Burk) that *Those who do not learn from history are doomed to repeat it*.1 So, we think that an important lesson is also to learn from previous mistakes and avoid repeating them.

Intuition is also not something to put aside capriciously, it is often found to be a strong driving force in the behaviour of people. But again, intuition is not always in concordance with research outcomes. Some research outcomes in assessment are somewhat counter intuitive or at least unexpected. Many researchers may not have exclaimed *Eureka* but *Hey, that is odd* instead.

This leaves us, as assessment researchers, with two very important tasks. First, we need to critically study which common and tradition-based practices still have value and

Practice points

- Neither good quality development of assessment in medical education, nor any scientific study related to assessment, can do without a sound knowledge of the theories underlying it.
- Validation is building a series of arguments to defend the principle that assessment results really represent the intended construct and without which validation is never complete.
- An assessment instrument is never valid *per se*, it is only valid for a specific goal or specific goals.
- The validity of an assessment instrument is generally not determined by its format but by its content.
- Reliability is the extent to which test results are reproducible and can be seen as one of the important components of the validity argument.
- When applying one of the theories on reliability, the user should be acquainted with the possibilities, limitations and underlying assumptions to avoid over- or underestimations of the reproducibility.
- In addition to calculating the reliability of an instrument, it is insightful to calculate the SEM as well and compare this to the original test data.
- When building an assessment programme, it is imperative to clearly define the goals of the assessment programme.

Correspondence: L. W. T. Flinders Innovations in Clinical Education, Health Professions Education, Flinders University, GPO Box 2100, Adelaide 5001, South Australia, Australia; email: lambert.schuwirth@flinders.edu.au

ISSN 0142–159X print/ISSN 1466–187X online/11/100783–15 © 2011 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.611022

2011; 33: 875–886 MEDICAL TEACHER

AMEE GUIDE

Self-regulation theory: Applications to medical education: AMEE Guide No. 58

JOHN SANDARS[1] & TIMOTHY J. CLEARY[2]
[1]University of Leeds, UK, [2]University of Wisconsin-Milwaukee, USA

Abstract

Self-regulation theory, as applied to medical education, describes the cyclical control of academic and clinical performance through several key processes that include goal-directed behaviour, use of specific strategies to attain goals, and the adaptation and modification to behaviours or strategies to optimise learning and performance. Extensive research across a variety of non-medical disciplines has highlighted differences in key self-regulation processes between high- and low-achieving learners and performers. Structured identification of key self-regulation processes can be used to develop specific remediation approaches that can improve performance in academic and complex psycho-motor skills. General teaching approaches that are guided by a self-regulation perspective can also enhance academic performance. Self-regulation theory offers an exciting potential for improving academic and clinical performance in medical education.

Introduction

In this theory-to-practice Guide, we will initially provide an integrative overview of self-regulation theory, as described by various scholars in educational psychology. Although we adopt a social-cognitive perspective, our aim is not to focus primarily on any one theoretical model but to provide a summary of the main theoretical principles shared among diverse perspectives. We will then discuss some of the extensive research that has been performed across a variety of non-medical disciplines. This research includes studies that highlight differences in key self-regulation processes between high- and low-achieving learners and performers, the use of structured identification of key self-regulation processes to develop specific remediation approaches and general teaching approaches that are guided by a self-regulation perspective. Finally, we will provide some practical tips to show how medical educators can use self-regulation theory and principles to inform teaching and learning. Many current approaches to teaching and learning in medical education already apply some aspects of self-regulation theory, such as encouraging students to set goals for their learning, but our opinion is that a more thorough application of the theory can benefit educators as they seek to enhance student academic and clinical performance.

Practice points

- Self-regulation theory, as applied to medical education, describes the cyclical control of academic and clinical performance through several key processes that include goal-directed behaviour, use of specific strategies to attain goals, and the adaptation and modification to behaviours or strategies to optimise learning and performance.
- There are differences in key self-regulation processes between high and low achieving learners and performers.
- Structured identification of key self-regulation processes can be used to develop specific remediation approaches that can improve both performance in academic and complex psycho-motor skills.
- General teaching approaches that develop key self-regulation processes can enhance academic performance.
- Self-regulation theory offers an exciting potential for improving academic and clinical performance in medical education.

What is self-regulation?

Self-regulation has been defined as, 'self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals' (Zimmerman 2000, p. 14). It is largely considered to be a process by which an individual seeks to accomplish goals through the self-directed use and modification of highly specific strategies. This process has been linked to optimal functioning in children, adolescents and adults across a diverse range of disciplines and content areas, from academic, athletic and music performance to the maintenance of mental and physical health (Cleary & Zimmerman 2001; Bandura 2005; Graham & Harris 2005; McPherson 2005). In addition, given the great range in interests and theoretical perspectives across these diverse domains, a variety of 'regulation-related' terms have been used in the literature, such as executive functioning, self-management, self-directedness, self-monitoring and self-control.

Correspondence: J. Sandars, Medical Education Unit, Leeds Institute of Medical Education, School of Medicine, Level 7 Worsley Building, University of Leeds, Leeds LS2 9LN, UK. Tel: +44 (0) 113 343 4193; fax: + 44 (0) 113 343 4910; email: j.e.sandars@leeds.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/11/110875–12 © 2011 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.595434

2011; 33: 961–973 MEDICAL TEACHER

AMEE GUIDE

How self-determination theory can assist our understanding of the teaching and learning processes in medical education. AMEE Guide No. 59

Th.J. TEN CATE, RASHMI A. KUSURKAR & GEOFFREY C. WILLIAMS
University Medical Center Utrecht, The Netherlands

Abstract

Self-determination Theory (SDT), designed by Edward Deci and Richard Ryan, serves among the current major motivational theories in psychology. SDT research has been conducted in many areas, among which are education and health care, but its applications in medical education are rare. The potential of SDT to help understand processes in medical education justifies this Guide. SDT is explained in seven principles, one of which is the distinction of three innate psychological needs of human beings: for competence, for autonomy and for relatedness. Further, SDT elaborates how humans tend to internalise regulation of behaviour that initially has been external, in order to develop autonomous, self-determined behaviour. Implications of SDT for medical education are discussed with reference to preparation and selection, curriculum structure, classroom teaching, assessments and examinations, self-directed learning, clinical teaching, students as teachers and researchers, continuing professional development, faculty development and stress among trainees.

Introduction

Learning, as educational psychology views it, requires cognitive, affective and metacognitive conditions to be successful (Short et al. 1989; Vermunt 1996), that is learning requires understanding of content, willingness to invest effort in studying and the ability to regulate one's learning. In other words, the *what*, *why* and *how* of learning are important for its success (Ten Cate et al. 2004). In this Guide, we focus on the affective component of learning, and more specifically on the motivation to learn. Self-determination theory (SDT) explains motivational processes and can help medical educators to understand and foster this important component of learning.

A guide for the 'self-determination' of students and teachers sounds like a paradox. How can self-determination be guided by others? Yet, the topic and the theory behind it is so important, practical and relevant for medical education that a detailed description of the SDT is of particular interest to the field of medical education. We hope and anticipate that medical educators who read this Guide will view education, their own efforts and the process of learning in medical students, residents and practicing doctors differently. We expect these readers to understand more of the causes of failures and successes and of mechanisms to steer and remediate the teaching and learning processes after reading this Guide.

SDT, developed by Edward Deci and Richard Ryan at the University of Rochester (Ryan & Deci 2000, Deci & Ryan 2000), is currently one of the major theories, if not *the* major theory, in the psychology of motivational processes. The SDT field is dynamic; this theory, based on early studies and the first theoretical description in the 1970s, is still the object of ongoing experimental research. It occupies a community of devoted researchers over the world who find and test applications of it in many domains of life—among which are health care and education—all of which further build its validity.

SDT is little known within the medical education community. Outside the Rochester group, only few references were found to discuss this theory related to medical education.

Practice points

- Human beings have a natural tendency to develop autonomous regulation of behaviour and are intrinsically motivated to learn and to take on challenges.
- Instrinsic motivation (IM) and internalisation of autonomous self-regulation require the satisfaction of three basic psychological needs: need for autonomy, competence and relatedness.
- Instrinsic motivation (IM) and autonomous self-regulation for learning is positively associated with academic performance and well-being.
- Autonomy-supportive teaching stimulates the development of IM and autonomous self-regulation of learning.
- Successes and failures in many elements of medical education can be understood from the perspective of SDT.

Correspondence: Th.J. ten Cate, Center for Research and Development of Education, University Medical Center Utrecht, HB 4.24, PO Box 85500, 3508 GA Utrecht, The Netherlands. Tel: +31 88 755 7010; fax: 31 88 755 3409; email: t.jtencate@umcutrecht.nl

ISSN 0142–159X print/ISSN 1466–187X online/11/120961–13 © 2011 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.595435

2012; 34: 1–10 MEDICAL TEACHER

AMEE GUIDE

Building bridges between theory and practice in medical education using a design-based research approach: AMEE Guide No. 60

DIANA H. J. M. DOLMANS & D. TIGELAAR

Maastricht University, The Netherlands

Abstract

Medical education research has grown enormously over the past 20 years, but it does not sufficiently make use of theories, according to influential leaders and researchers in this field. In this AMEE Guide, it is argued that design-based research (DBR) studies should be conducted much more in medical education design research because these studies both advance the testing and refinement of theories and advance educational practice. In this Guide, the essential characteristics of DBR as well as how DBR differs from other approach such as formative evaluation are explained. It is also explained what the pitfalls and challenges of DBR are. The main challenges deal with how to insure that DBR studies reveal findings that are of a broader relevance than the local situation and how to insure that DBR contributes toward theory testing and refinement. An example of a series of DBR studies on the design of a teaching portfolio in higher education that is aimed at stimulating a teacher's professional development is described, to illustrate how DBR studies actually work in practice. Finally, it is argued that DBR-studies could play an important role in the advancement of theory and practice in the two broad domains of designing or redesigning work-based learning environments and assessment programs.

Introduction

What is the problem?

Medical education research has grown enormously over the past 20 years worldwide. The number of scientific journals has increased and also the number of participants at international conferences on medical education research (Eva 2009). But, does medical education research lead to improvements in educational practice and does it contribute toward the advancement of knowledge?

Educational practitioners often complain that there is a gap between educational research and educational practice (Badley 2003). They argue that the research that is conducted within the general education domain is not relevant for educational practice. Within medical education research, it is often argued that medical education research does not contribute toward an increase of a body of knowledge or theory building (Albert et al. 2007). According to influential leaders in the field, a lot of studies are being reported in the medical educational journals that have already been done before and that do not add new knowledge. A number of studies lack a theoretical background (Albert et al. 2007; Norman 2007). This is a big problem. If studies are being conducted that do not rest on theories, then it will become very difficult to understand or explain the underlying factors or causes or to explain why an intervention works or does not work.

Practice points

- Good DBR does contribute toward both testing and refinement of theories and improving educational practice.
- Good DBR is characterized by a close interaction between practitioners, designers, and researchers.
- DBR uses a mixed-methods approach to understand underlying the processes or factors.
- DBR leads to design guidelines that specify which characteristics are crucial for a particular intervention in a specific context.
- DBR is a fruitful approach for design research especially when (re-)designing work-based learning environments and assessment programs.

Educational research, both in general education and medical education, should both contribute toward the building of a body of knowledge and theories (Reeves et al. 2008; Monrouxe & Rees 2009) and understanding problems encountered in educational practice (Eva 2009). Education takes place in a complex environment in which many variables interact with each other (Berliner 2002; Kember 2003). Education research should therefore not only be aimed at proving whether an intervention works or not but also should be aimed at understanding this complexity (Regehr 2010). Education research should be aimed at investigating how

Correspondence: D. H. J. M. Dolmans, Department of Educational Development & Research, Faculty of Health, Medicine and Life Sciences, School of Health Professions Education (SHE), Maastricht University, P.O. Box 616, Maastricht, The Netherlands. Tel: 31 43 388 5730; fax: 31 43 388 5779; email: d.dolmans@maastrichtuniversity.nl

ISSN 0142–159X print/ISSN 1466–187X online/12/010001–10 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2011.595437

2012; 34: e64–e77 MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Integrating professionalism into the curriculum: AMEE Guide No. 61

HELEN O'SULLIVAN[1], WALTHER VAN MOOK[2], RAY FEWTRELL & VAL WASS[3]
[1]The University of Liverpool, UK, [2]Maastricht University, The Netherlands, [3]Keele Univeristy, UK

Abstract

Professional values and behaviours are intrinsic to all medical practice, yet remain one of the most difficult subjects to integrate explicitly into a curriculum. Professionalism for the twenty-first century raises challenges not only to adapting the course to changing societal values but also for instilling skills of ongoing self-directed continuous development in trainees for future revalidation. This Guide is based on the contemporary available literature and focuses on instilling Professionalism positively into both undergraduate and postgraduate training deliberately avoiding the more negative aspects of Fitness to Practise. The literature on Professionalism is extensive. An evidence-based approach has been taken throughout. We have selected only some of the available publications to offer practical advice. Comprehensive reviews are available elsewhere (van Mook et al. 2009a–g). This Guide takes a structured stepwise approach and sequentially addresses: (i) agreeing an institutional definition, (ii) structuring the curriculum to integrate learning across all years, (iii) suggesting learning models, (iv) harnessing the impact of the formal, informal and hidden curricula and (v) assessing the learning. Finally, a few well-evaluated case studies for both teaching and assessment have been selected to illustrate our recommendations.

Introduction

Professionalism has been recognised for centuries as fundamental to medical practice, yet it has remained one of the most intangible and difficult areas within both undergraduate and postgraduate training. As far back as Ancient Greece, the Hippocratic Oath gave witness to the importance paid to a doctor's professional attitudes and behaviour. Yet, though well recognised as intrinsic to practice, integrating professionalism explicitly into the curriculum to make its importance both explicit to students and trainees and a tangible measurable outcome remains challenging. Perhaps not surprisingly, identifying students who demonstrate unprofessional behaviour and are not deemed Fit to Practise has over the years become an increasing focus within medical schools. This gained even more momentum when Papadakis et al. (2004) demonstrated a possible link between unprofessional behaviour in medical school and subsequent practice. Thus, professionalism within the curriculum risks assuming a negative perspective. Failure to demonstrate appropriate attitudes and to improve behaviour despite feedback and remediation is ultimately punished. The reverse potential, i.e. acknowledging and rewarding high standards of professionalism in students and trainees, is lost. The opportunity to place a positive value on this key area of the curriculum risks being overlooked. We need more robust systems to ensure that understanding, learning and valuing Professionalism gains a high and explicit status within medical training. Positive acknowledgement of achievements and excellence in this subject area is comparably essential. This needs to be seen by students as having greater emphasis than merely addressing unprofessional behaviour. We have therefore chosen to focus this Guide on integrating these positive aspects of Professionalism into the curriculum and not to place emphasis on Fitness to Practise and unprofessional behaviour.

Practice points

- Professionalism reflects societal values. An institutional definition must be agreed.
- Situated learning in the early years is not enough. Learning must be supported in the workplace.
- Role models are powerful. Both positive and negative behaviour will be seen.
- Reflection on action and mentoring are important to ensure appropriate learning is achieved.
- Assessment must be integrated across the course using multiple tools.

We highlight three challenges. First, it is important to instil and nurture the development of the personal qualities, values, attitudes and behaviours which are fundamental to health care in current society. As this Guide highlights, there remains a demonstrable lack of consensus on reaching a culturally appropriate global definition. Core values are shared but diverse changing societal values inevitably influence institutional understanding and hence the identification of the desired educational outcomes. Consensus must be reached within individual institutions on what is to be learned and assessed. These institutional values should be instilled in and

Correspondence: Helen O'Sullivan, Institute of Learning and Teaching, Faculty of Health and Life Sciences, The University of Liverpool, Cedar House, Ashton Street, Liverpool L69 3GE, UK. Tel: 44-44 (0) 151 794 8752; email: h.m.osullivan@liv.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/12/030054–14 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.656610

2012; 34: e102–e115

WEB PAPER
AMEE GUIDE: THEORIES IN MEDICAL EDUCATION

Experiential learning: AMEE guide No. 63

SARAH YARDLEY[1], PIM W. TEUNISSEN[2] & TIM DORNAN[2]

[1]Keele University, UK, [2]Maastricht University, The Netherlands

Abstract

This Guide provides an overview of educational theory relevant to learning from experience. It considers experience gained in clinical workplaces from early medical student days through qualification to continuing professional development. Three key assumptions underpin the Guide: learning is 'situated'; it can be viewed either as an individual or a collective process; and the learning relevant to this Guide is triggered by authentic practice-based experiences. We first provide an overview of the guiding principles of experiential learning and significant historical contributions to its development as a theoretical perspective. We then discuss socio-cultural perspectives on experiential learning, highlighting their key tenets and drawing together common threads between theories. The second part of the Guide provides examples of learning from experience in practice to show how theoretical stances apply to clinical workplaces. Early experience, student clerkships and residency training are discussed in turn. We end with a summary of the current state of understanding.

Introduction

The statement 'one learns from experience' will probably conjure up pictures of undergraduate medical students learning from patients during clerkships, residents learning whilst caring for patients, or trained physicians sustaining and enhancing their mastery of clinical practice. It would not be wrong to also regard dissecting a cadaver, participating in a problem-based learning group, or being instructed in a skills laboratory as 'experiential learning', but our focus here is on authentic experience gained in clinical workplaces. To discuss the types of experiential learning that are dissociated from clinical practice would take us to a rather different type of 'experience' and into reflective and cognitive learning theories, which need a separate Guide to do them justice (interested readers are directed to the companion AMEE Guide of Sandars 2010: 'The use of reflection in medical education').

From a user's perspective, it would be simpler if there was just one set of learning theories, but that is unfortunately not true. There are whole families of them, which means that anyone wishing to put their teaching or research on a theoretical footing has to make choices. Since it is good practice to state the assumptions that underpin such choices, below are the ones that the authors feel underpin this Guide:

- Learning is 'situated'. Learning cannot be dissociated from the context in which it occurs and an important aspect of any such context is its social nature. Developing transferable learning requires understanding both the context in which learning was originally situated and its potential for applicability in other contexts with or without refinement. These ideas are discussed in detail on the companion AMEE Guide on Situativity Theory (Durning & Artino 2011).
- Learning can be viewed either as an individual or a collective process. In this Guide, we emphasise that interactions are fundamental to experiential learning. This means that, although individuals may construct different understandings from experience, these are still considered to derive from multi-directional influences between them and others in the context, that is, from a collective experience.
- The learning that is relevant to this Guide is triggered by authentic practice-based experiences. It is the way people learn to practice from experience gained within real life, workplace learning.

Practice points

- The work of many experiential learning and socio-cultural theorists is underpinned by constructionist philosophies.
- Socio-cultural learning theories acknowledge the importance of interactions for both individuals and collective learning in workplaces.
- Context and potential for participation (in terms of opportunities and type of participants) must be accounted for when designing an experiential learning intervention.
- Educators need to distinguish between theoretical concepts which describe ideal learning circumstances (and aspire to reproduce these) and experience in practice, in order to address the realities of education in complex workplaces.

Correspondence: S. Yardley, Keele Medical School, Keele University, Staffs, ST5 5BG, UK. Tel: + 44(0) 1782 734694; fax: + 44(0) 1782 734694; email: s.yardley@hfac.keele.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/12/030102–14 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.650741

2012; 34: e148–e160 MEDICAL TEACHER

WEB PAPER
AMEE GUIDE
THEORIES IN MEDICAL EDUCATION

Control-value theory: Using achievement emotions to improve understanding of motivation, learning, and performance in medical education: AMEE Guide No. 64

ANTHONY R. ARTINO JR.[1], ERIC S. HOLMBOE[2] & STEVEN J. DURNING[1]
[1]Uniformed Services University of the Health Sciences, USA, [2]American Board of Internal Medicine, USA

Abstract

In this AMEE Guide, we consider the emergent theoretical and empirical work on human emotion and how this work can inform the theory, research, and practice of medical education. In the Guide, we define emotion, in general, and achievement emotions, more specifically. We describe one of the leading contemporary theories of achievement emotions, *control-value theory* (Pekrun 2006), and we distinguish between different types of achievement emotions, their proximal antecedents, and their consequences for motivation, learning, and performance. Next, we review the empirical support for control-value theory from non-medical fields and suggest several important implications for educational practice. In this section, we highlight the importance of designing learning environments that foster a high degree of control and value for students. Finally, we end with a discussion of the need for more research on achievement emotions in medical education, and we propose several key research questions we believe will facilitate our understanding of achievement emotions and their impact on important educational outcomes.

Introduction: Emotions and learning

Emotions are ever-present in academic and clinical settings. Consider a second-year medical student preparing for a major exam. He probably hopes for success, may worry about failure, and likely feels relieved once the exam is over. These emotions – hope, worry, and relief – likely influence his motivation, the effort he puts forth, and even the study strategies he uses to help him understand the material. Similarly, think of a young intern/pre-registrar preparing to perform a new clinical activity. Depending on her goals, the nature of the activity, and the social support she receives within the clinical setting, she may enjoy preparing for the activity, feel bored because it is not really interesting to her, or experience frustration because the new activity simply represents one more thing to do in her never-ending list of things to do. Once again, these emotions – enjoyment, boredom, and frustration – almost certainly affect her preparation, her motivation to persist in the face of difficulties, and the motivational strategies she employs to stay on task and curb non-adaptive behaviors like procrastination.

Historically, these types of emotions have received little attention from education researchers, in general, and medical education researchers, more specifically. Two notable exceptions in the educational psychology literature are Weiner's (1985) work on attribution theory and the abundance of test-anxiety research conducted over the last 30 years (for a review, see Zeidner 1998). Notwithstanding these exceptions, most classic models of cognition, such as traditional information-processing theories (Miller 1956), do not consider "non-cognitive" constructs like emotion and motivation to be theoretically interesting or even important (Dweck et al. 2004). Indeed, many psychologists previously conceptualized human thinking – and more specifically, academic thinking – as primarily a cognitive activity, relatively free from emotion and motivation (Brown et al. 1983). The implication of these "cognition-only" models of human thinking is, *an account of thinking as fully disembodied, objective, mechanical, rational, and cold* (Dai & Sternberg 2004, p. 5). Described by some as *cold-cognition* models (Pintrich et al. 1993; Pintrich 2003), these theoretical perspectives do not account for individuals who seem to have the requisite knowledge and skills but fail to activate these knowledge and skills when necessary (Bereiter & Scardamalia 1985).

In response to the limitations of *cold-cognition* models, scholars across diverse fields of inquiry have called for more integrative approaches to human thinking and learning (Dai & Sternberg 2004; Linnenbrink & Pintrich 2004; Picard et al. 2004; Artino & Durning 2011). Such approaches emphasize *affect* and put emotion and motivation on a similar footing as

Correspondence: A. R. Artino, Associate Professor of Preventive Medicine and Biometrics, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MI. 20814-4712, USA. Tel: +1 301 295 3693; fax: 301-295-0752; email: anthony.artino@usuhs.mil

ISSN 0142–159X print/ISSN 1466–187X online/12/030148–13 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.651515

2012, e1–e13, Early Online MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Team-based learning: A practical guide: AMEE Guide No. 65

DEAN PARMELEE[1], LARRY K. MICHAELSEN[2], SANDY COOK[3] & PATRICIA D. HUDES[1]
[1]Wright State University, USA, [2]University of Central Missouri, USA, [3]Duke-NUS Graduate Medical School, Singapore

Abstract

Team-based learning™ (TBL) is an instructional strategy developed in the business school environment in the early 1990s by Dr Michaelsen who wanted the benefits of small group learning within large classes. In 2001, a US federal granting agency awarded funds for educators in the health sciences to learn about and implement the strategy in their educational programs; TBL was put forward as one such strategy and as a result it is used in over 60 US and international health science professional schools. TBL is very different from problem-based learning (PBL) and other small group approaches in that there is no need for multiple faculty or rooms, students must come prepared to sessions, and individual and small groups of students (teams) are highly accountable for their contributions to team productivity. The instructor must be a content-expert, but need not have any experience or expertise in group process to conduct a successful TBL session. Students do not need any specific instruction in teamwork since they learn how to be collaborative and productive in the process. TBL can replace or complement a lecture-based course or curriculum.

Introduction

What is team-based learning?

Team-based learning™ (TBL) is an active learning and small group instructional strategy that provides students with opportunities to apply conceptual knowledge through a sequence of activities that includes individual work, team work and immediate feedback. It is used with large classes (>100 students) or smaller ones (<25 students), incorporating multiple small groups of 5–7 students each, in a single classroom. TBL is specifically characterized by three key components:

- individual advance student preparation;
- individual and team readiness assurance tests (tRATs); and
- the majority of in-class time devoted to decision-based application assignments done in teams.

TBL is highly learner-centered (yet has critical faculty input) and uses grading, peer evaluation and immediate feedback to ensure individual and team accountability to promote learning and, unlike other group-based instructional approaches, one content-expert instructor can instruct 20 or more teams.

TBL is used in over 60 US and international health science professional schools, including medicine, dentistry, veterinary medicine, nursing, and allied health disciplines, at several levels of training: undergraduate, postgraduate, and continuing professional education.

When TBL is conducted correctly, there is little question that academic outcomes are equivalent or improved in comparison to either lecture-based formats or more traditional small group learning models (McKiernan 2003; Levine et al. 2004; Koles et al. 2005, 2010; Shellenberger et al. 2009; Zgheib et al. 2010; Thomas & Bowen 2011).

Unlike typical group learning, the high performers do not suffer – by either having to do all the work or poor performers dragging their scores down. The process holds everyone accountable for their own individual work and the individual's contribution to their team. The better a team works together, the better their team and individual scores. Extensive peer teaching occurs within each team.

Faculty may fear that the team scores mask the under-performing student. In reality, TBL provides more data, earlier, about an individual's weaknesses and permits team members

> **Practice points**
>
> - TBL is a learner-centered, instructor-directed strategy for small group active learning in large group educational settings.
> - Learners are *accountable*, expected to prepare outside of class and collaborate with their team members to solve authentic problems and make decisions in class.
> - Only one content-expert instructor is needed for the whole class in one room.
> - Students learn how to work in teams through the process of TBL – they do not need additional instruction nor does the instructor need be a group process expert.
> - A backward design, outcomes-based approach is used to stay focused on what the learners should be able to do.
> - One must use TBL's key components and follow the process for TBL to be successful.

Correspondence D. Parmelee, Academic Affairs, Boonshoft School of Medicine, Wright State University, PO Box 927, Dayton, OH 45401-0927, USA. Tel: 937 775 2161; fax: 937 775 2842; email: dean.parmelee@wright.edu

ISSN 0142–159X print/ISSN 1466–187X online/12/030001–13 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.651179

2012; 34: 245–248 MEDICAL TEACHER

Post-examination interpretation of objective test data: Monitoring and improving the quality of high–stakes examinations – a commentary on two AMEE Guides[1]

MOHSEN TAVAKOL & REG DENNICK
University of Nottingham, UK

Abstract

As great emphasis is rightly placed upon the importance of assessment to judge the quality of our future healthcare professionals, it is appropriate not only to choose the most appropriate assessment method, but to continually monitor the quality of the tests themselves, in a hope that we may continually improve the process. This article stresses the importance of quality control mechanisms in the exam cycle and briefly outlines some of the key psychometric concepts including reliability measures, factor analysis, generalisability theory and item response theory. The importance of such analyses for the standard setting procedures is emphasised. This article also accompanies two new AMEE Guides in Medical Education (Tavakol M, Dennick R. Post-examination Analysis of Objective Tests: AMEE Guide No. 54 and Tavakol M, Dennick R. 2012. Post examination analysis of objective test data: Monitoring and improving the quality of high stakes examinations: AMEE Guide No. 66) which provide the reader with practical examples of analysis and interpretation, in order to help develop valid and reliable tests.

Introduction

The two new AMEE Guides in Medical Education (Takavol & Dennick 2011b; Takavol & Dennick 2012) provide an introduction to the important processes of post-examination analysis of objective assessments. In our experience, methods used to analyse exam data are unfortunately scattered amongst text books on psychometrics and are often described using statistical and mathematical nomenclature which can inhibit the novice. In these Guides, we have attempted to simplify, as much as possible, the key concepts and processes required to analyse and interpret post-examination data. We are aware that the psychometric analysis of objective tests is not universally adopted. We suspect that one reason for this is a lack of understanding of basic psychometric concepts and procedures. Therefore, we hope that a wide range of healthcare professionals and educators, who have not been trained in psychometric techniques, will find useful practical advice for improving the quality of their assessments. The purpose of the following commentary is to provide a brief introduction into some of the key concepts and practices of psychometric analysis of objective tests. The two Guides have more detailed information and advice on using statistical packages such as SPSS.

Quality assurance of the exam cycle

The exam cycle begins with the writing of questions, or the acquisition of questions from item banks. This is followed by test construction, standard setting and test delivery. Finally, there is post-examination analysis of the results and the production of reports that can feedback into each component of the cycle. The quality assurance of all the elements in this cycle is very important.

There is a strong link between the overall quality of assessment and the quality of individual questions or individual Objective Structured Clinical Examination (OSCE) stations. Medical educators should ensure that the minimum standards of assessment are attained and then maximised in order to legitimise examination content and student scores. Qualitative and quantitative psychometric methods can been used to detect anomalous questions in order to improve their quality. Psychometric test results can be fed back to those who are involved in improving examination tests, including test constructors and standard setters. This will enable them to make more informed judgements concerning individual questions and individual stations and hence they can select questions that are most appropriate for assessing students with low measurement error. In addition, psychometric analysis can identify student guessing behaviour, it can identify sources of item unfairness between groups (e.g. gender) plus it can identify the relationship between item difficulty and student ability in order to improve construct validity. Using such information, medical educators can develop item banks which can be used in national assessment databases and for computer adaptive testing (CAT).

Correspondence R. Dennick, Medical Education Unit, Medical School, University of Nottingham, Nottingham NG7 2UH, UK. Tel: (44) 0115 823 0013; fax: (44) 0115 823 0014; email: reg.dennick@nottingham.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/12/030245–4 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.643266

2012; 34: e161–e175

WEB PAPER
AMEE GUIDE

Post-examination interpretation of objective test data: Monitoring and improving the quality of high-stakes examinations: AMEE Guide No. 66

MOHSEN TAVAKOL & REG DENNICK
University of Nottingham, UK

Abstract

The purpose of this Guide is to provide both logical and empirical evidence for medical teachers to improve their objective tests by appropriate interpretation of post-examination analysis. This requires a description and explanation of some basic statistical and psychometric concepts derived from both Classical Test Theory (CTT) and Item Response Theory (IRT) such as: descriptive statistics, explanatory and confirmatory factor analysis, Generalisability Theory and Rasch modelling. CTT is concerned with the overall reliability of a test whereas IRT can be used to identify the behaviour of individual test items and how they interact with individual student abilities. We have provided the reader with practical examples clarifying the use of these frameworks in test development and for research purposes.

Introduction

The output of the examination process is transferred to students either formatively, in the form of feedback, or summatively, as a formal judgement on performance. Clearly, to produce an output which fulfils the needs of students and the public, it is necessary to define, monitor and control the inputs to the process. Classical Test Theory (CTT) assumes that inputs to post-examination analysis contain sources of measurement error that can influence the student's observed scores of knowledge and competencies. Sources of measurement error is derived from test construction, administration, scoring and interpretation of performance. For example; quality variation among knowledge-based questions, differences between raters, differences between candidates and variation between standardised patients (SPs) within an Objective Structured Clinical Examination (OSCE).

To improve the quality of high-stakes examinations, errors should be minimised and, if possible, eliminated. CTT assumes that minimising or eliminating sources of measurement errors will cause the observed score to approach the true score. Reliability is the key estimate showing the amount of measurement error in a test. A simple interpretation is that reliability is the correlation of the test with itself; squaring this correlation, multiplying it by 100 and subtracting from 100 gives the percentage error in the test. For example, if an examination has a reliability of 0.80, there is 36% error variance (random error) in the scores. As the estimate of reliability increases, the fraction of a test score that is attributable to error will decrease. Conversely, if the amount of error increases, reliability estimates will decrease (Nunnally & Bernstein 1994).

Practice points

- Health profession educators need to interpret test data using psychometric methods.
- EFA describes how and to what extent a group of items in a test are related to a set of latent constructs or factors. CFA confirms the modelled relationship between the assessed factors.
- Generalisability theory extends CTT allowing assessors to isolate and estimate multiple errors that are influencing the results of a test.
- IRT, including Rasch modelling, produces a variety of data displays, encapsulating both student and item properties that enable test developers to monitor and improve the quality of test questions.

Although some medical schools have adopted psychometric methods such as reliability testing and item analysis to monitor and improve OSCE examination (Lawson 2006; Iramaneerat et al. 2008), the use of advanced psychometric methods such as generalisability theory and Rasch modelling has yet to become widespread.

Therefore, the objective of this Guide is to illustrate the use and interpretation of traditional and advanced psychometric methods using several examples. Ultimately, readers are encouraged to consider using these methods with their own exam data. We have explained how to generate post-examination data from objective tests using SPSS elsewhere (Tavakol & Dennick 2011b), and therefore we will not discuss these methods in this article. We shall begin with the

Correspondence: R. Dennick, Medical Education Unit, Medical School, University of Nottingham, Nottingham NG7 2UH, United Kingdom. Tel: +44 (0)115 823 0013; fax: +44 (0)115 823 0014; email: reg.dennick@nottingham.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/12/030161–15 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.651178

2012; 34: e161–e175

WEB PAPER
AMEE GUIDE

Post-examination interpretation of objective test data: Monitoring and improving the quality of high-stakes examinations: AMEE Guide No. 66

MOHSEN TAVAKOL & REG DENNICK
University of Nottingham, UK

Abstract

The purpose of this Guide is to provide both logical and empirical evidence for medical teachers to improve their objective tests by appropriate interpretation of post-examination analysis. This requires a description and explanation of some basic statistical and psychometric concepts derived from both Classical Test Theory (CTT) and Item Response Theory (IRT) such as: descriptive statistics, explanatory and confirmatory factor analysis, Generalisability Theory and Rasch modelling. CTT is concerned with the overall reliability of a test whereas IRT can be used to identify the behaviour of individual test items and how they interact with individual student abilities. We have provided the reader with practical examples clarifying the use of these frameworks in test development and for research purposes.

Introduction

The output of the examination process is transferred to students either formatively, in the form of feedback, or summatively, as a formal judgement on performance. Clearly, to produce an output which fulfils the needs of students and the public, it is necessary to define, monitor and control the inputs to the process. Classical Test Theory (CTT) assumes that inputs to post-examination analysis contain sources of measurement error that can influence the student's observed scores of knowledge and competencies. Sources of measurement error is derived from test construction, administration, scoring and interpretation of performance. For example; quality variation among knowledge-based questions, differences between raters, differences between candidates and variation between standardised patients (SPs) within an Objective Structured Clinical Examination (OSCE).

To improve the quality of high-stakes examinations, errors should be minimised and, if possible, eliminated. CTT assumes that minimising or eliminating sources of measurement errors will cause the observed score to approach the true score. Reliability is the key estimate showing the amount of measurement error in a test. A simple interpretation is that reliability is the correlation of the test with itself; squaring this correlation, multiplying it by 100 and subtracting from 100 gives the percentage error in the test. For example, if an examination has a reliability of 0.80, there is 36% error variance (random error) in the scores. As the estimate of reliability increases, the fraction of a test score that is attributable to error will decrease. Conversely, if the amount of error increases, reliability estimates will decrease (Nunnally & Bernstein 1994).

Practice points

- Health profession educators need to interpret test data using psychometric methods.
- EFA describes how and to what extent a group of items in a test are related to a set of latent constructs or factors. CFA confirms the modelled relationship between the assessed factors.
- Generalisability theory extends CTT allowing assessors to isolate and estimate multiple errors that are influencing the results of a test.
- IRT, including Rasch modelling, produces a variety of data displays, encapsulating both student and item properties that enable test developers to monitor and improve the quality of test questions.

Although some medical schools have adopted psychometric methods such as reliability testing and item analysis to monitor and improve OSCE examination (Lawson 2006; Iramaneerat et al. 2008), the use of advanced psychometric methods such as generalisability theory and Rasch modelling has yet to become widespread.

Therefore, the objective of this Guide is to illustrate the use and interpretation of traditional and advanced psychometric methods using several examples. Ultimately, readers are encouraged to consider using these methods with their own exam data. We have explained how to generate post-examination data from objective tests using SPSS elsewhere (Tavakol & Dennick 2011b), and therefore we will not discuss these methods in this article. We shall begin with the

Correspondence: R. Dennick, Medical Education Unit, Medical School, University of Nottingham, Nottingham NG7 2UH, United Kingdom. Tel: +44 (0)115 823 0013; fax: +44 (0)115 823 0014; email: reg.dennick@nottingham.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/12/030161–15 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.651178

2012; 34: e288–e299

WEB PAPER
AMEE GUIDE

Program evaluation models and related theories: AMEE Guide No. 67

ANN W. FRYE[1] & PAUL A. HEMMER[2]

[1]Office of Educational Development, University of Texas Medical Branch, 301 University Boulevard, Galveston, Texas 77555-0408, USA, [2]Department of Medicine, Uniformed Services, University of the Health Sciences, F. Edward Hebert School of Medicine, Bethesda, MD, USA

Abstract

This Guide reviews theories of science that have influenced the development of common educational evaluation models. Educators can be more confident when choosing an appropriate evaluation model if they first consider the model's theoretical basis against their program's complexity and their own evaluation needs. Reductionism, system theory, and (most recently) complexity theory have inspired the development of models commonly applied in evaluation studies today. This Guide describes experimental and quasi-experimental models, Kirkpatrick's four-level model, the Logic Model, and the CIPP (Context/Input/Process/Product) model in the context of the theories that influenced their development and that limit or support their ability to do what educators need. The goal of this Guide is for educators to become more competent and confident in being able to design educational program evaluations that support intentional program improvement while adequately documenting or describing the changes and outcomes—intended and unintended—associated with their programs.

Introduction

Program evaluation is an essential responsibility for anyone overseeing a medical education program. A "program" may be as small as an individual class session, a course, or a clerkship rotation in medical school or it may be as large as the whole of an educational program. The "program" might be situated in a medical school, during postgraduate training, or throughout continuing professional development. All such programs deserve a strong evaluation plan. Several detailed and well written articles, guides, and textbooks about educational program evaluation provide overviews and focus on the "how to" of program evaluation (Woodward 2002; Goldie 2006; Musick 2006; Durning et al. 2007; Frechtling 2007; Stufflebeam & Shinkfield 2007; Hawkins & Holmboe 2008; Cook 2010; Durning & Hemmer 2010; Patton 2011). Medical educators should be familiar with these and have some of them available as resources.

This Guide will be most helpful for medical educators who wish to familiarize themselves with the theoretical bases for common program evaluation approaches so that they can make informed evaluation choices. Educators engaged in program development or examining an existing educational program will find that understanding theoretical principles related to common evaluation models will help them be more creative and effective evaluators. Similar gains will apply when an education manager engages an external evaluator or is helping to evaluate someone else's program. Our hope is that this Guide's focus on several key educational evaluation models

Practice points

- Educational programs are fundamentally about change; program evaluation should be designed to determine whether change has occurred.
- Change can be intended or unintended; program evaluation should examine for both.
- Program evaluation studies have been strongly influenced by reductionist theory, which attempts to isolate individual program components to determine associations with outcomes.
- Educational programs are complex, with multiple interactions among participants and the environment, such that system theory or complexity theory may be better suited to informing program evaluation.
- The association between program elements and outcomes may be non-linear—small changes in program elements may lead to large changes in outcomes and vice-versa.
- Always keep an open mind—if you believe you can predict the outcome of an educational program, you may be limiting yourself to an incomplete view of your program.
- Choose a program evaluation model that allows you to examine for change in your program and one that embraces the complexity of the educational process.

Correspondence: Ann W. Frye, Office of Educational Development, University of Texas Medical Branch, 301 University Boulevard, Galveston, Texas 77555-0408, USA. Tel: 409-772-2791; fax: 409-772-6339; email: awfrye@utmb.edu

ISSN 0142-159X print/ISSN 1466-187X online/12/050288–12 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.668637

2012; 34: 960–992 MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Generalizability theory for the perplexed: A practical introduction and guide: AMEE Guide No. 68

RALPH BLOCH & GEOFFREY NORMAN
McMaster University, Canada

Abstract

Background: Generalizability theory (G theory) is a statistical method to analyze the results of psychometric tests, such as tests of performance like the Objective Structured Clinical Examination, written or computer-based knowledge tests, rating scales, or self-assessment and personality tests. It is a generalization of classical reliability theory, which examines the relative contribution of the primary variable of interest, the performance of subjects, compared to error variance. In G theory, various sources of error contributing to the inaccuracy of measurement are explored. G theory is a valuable tool in judging the methodological quality of an assessment method and improving its precision.

Aim: Starting from basic statistical principles, we gradually develop and explain the method. We introduce tools to perform generalizability analysis, and illustrate the use of generalizability analysis with a series of common, practical examples in educational practice.

Conclusion: We realize that statistics and mathematics can be either boring or fearsome to many physicians and educators, yet we believe that some foundations are necessary for a better understanding of generalizability analysis. Consequently, we have tried, wherever possible, to keep the use of equations to a minimum and to use a conversational and slightly "off-serious" style.

Introduction

Although we wrote this monograph primarily for Members of the Association for Medical Education in Europe (AMEE), it could be of interest to any serious medical educator, in fact, any educator who is involved with the development and administration of assessment procedures.

Society, appropriately, is concerned with the professional competency of physicians, yet it lacks the prerequisite ability to supervise it. Consequently, it has delegated the responsibility for quality assurance to the professional colleges and medical schools. These, in turn, have built up a veritable "assessment industry". But, who assesses the assessment? Thus, we have all gradually become increasingly conscious of the need for quality assurance of high stakes assessment. One of the most powerful tools to explore the value of methods to evaluate knowledge, skills and, possibly, attitudes, is generalizability theory or as it is more commonly known, G theory.

Yet, for many of us, G theory is still a black art. Basically, it (G theory) explores the fundamental question: to what extent can we extrapolate the results achieved on a limited sample of test tasks, measured under unique test conditions to a universe of tasks and conditions, from which the specific test set has been drawn more or less arbitrarily.

The literature on G theory is no easy fare, nor do tools for G theory data processing abound. Some four years ago, we started to develop a computer program – G_String – to give evaluation practitioners a tool to analyze their data using G theory. G_String wraps around a command line program, performing the core calculations, called urGENOVA (University of Iowa), written by Robert L. Brennan, one of the leading experts in the field. The name of our software, "G_String", has raised more than one eyebrow and academic firewall concerned with propriety. In fact, the semantics are quite innocent: "G" stands for generalizability, and "Strings" are lexical sequences of symbols (letters) which the program

Practice points

- Testing knowledge and performance is a measurement.
- Measurements provide a mixture of true data (signal) and confounders (noise).
- Statistical methods like G theory allow us to separate noise from signal, identify sources of noise, and devise ways to reduce their contribution to the final results.
- G theory is a powerful method to achieve this goal.
- G theory is an extension of the two-factor, random-model ANOVA.
- G theory, like any analytical tool, is only useful if it is accompanied by careful experimental design, planning, and analysis.

Correspondence: R. Bloch, Faculty of Health Sciences, McMaster University, 1280 Main Street West, Hamilton, ON, L8S 4K1, Canada. Tel: 905-525-9140 ext. 23114; fax: 905-572-7099; email: blochr@mcmaster.ca

ISSN 0142-159X print/ISSN 1466-187X online/12/010960–33 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.703791

2012; 34: 754–771

WEB PAPER
AMEE GUIDE

Developing research skills in medical students: AMEE Guide No. 69

ANITA LAIDLAW, JIM AITON, JULIE STRUTHERS & SIMON GUILD
University of St Andrews, UK

Abstract

This Guide has been written to provide guidance for individuals involved in curriculum design who wish to develop research skills and foster the attributes in medical undergraduates that help develop research. The Guide will provoke debate on an important subject, and although written specifically with undergraduate medical education in mind, we hope that it will be of interest to all those involved with other health professionals' education. Initially, the Guide describes why research skills and its related attributes are important to those pursuing a medical career. It also explores the reasons why research skills and an ethos of research should be instilled into professionals of the future. The Guide also tries to define what these skills and attributes should be for medical students and lays out the case for providing opportunities to develop research expertise in the undergraduate curriculum. Potential methods to encourage the development of research-related attributes are explored as are some suggestions as to how research skills could be taught and assessed within already busy curricula.

This publication also discusses the real and potential barriers to developing research skills in undergraduate students, and suggests strategies to overcome or circumvent these. Whilst we anticipate that this Guide will appeal to all levels of expertise in terms of student research, we hope that, through the use of case studies, we will provide practical advice to those currently developing this area within their curriculum.

Introduction

Concerns have been expressed over the lack of numbers of future doctors wishing to conduct clinical research and the abilities of the 'physician-scientist' to conduct research (Goldstein & Brown 1997; Zerilo et al. 2000; Association of American Medical Colleges (AAMC) 2001; Sung et al. 2003; Cooke et al. 2006). Basic scientific research is expanding, yet the number of clinical academics participating in research is shrinking (Goldstein & Brown, 1997; Zerilo et al., 2000), perhaps reflecting that clinicians are required to choose between performing research or practicing medicine and are finding it increasingly difficult to include both in their careers. The reasons for this appear to be the financial costs of doing both research and clinical practice, the increasing demands and workload of clinical practice and the increasing specialisation and knowledge required for basic scientific research (Goldstein & Brown 1997; Zerilo et al. 2000; AAMC 2001; Sung et al. 2003; Cooke et al. 2006). Such concerns are not restricted to the medical profession; they extend into other vocational subjects such as veterinary medicine. (Selborne 1997). Ensuring the door to research is not closed to future medical professionals requires them to understand the basic skills of research and to have an awareness of a research ethos at an early stage.

The purpose of this Guide is to identify the skills and attributes that medical students require to understand and/or participate in research, and the role that these research skills

Practice points

- Those with responsibility for undergraduate medical programmes as well as medical students themselves need to be made aware that research is an important part of scholarship and professional practice.
- Good doctors needs specific research skills and develop specific research-related attributes. Training in research skills and the development of research attributes is therefore required to ensure that students are competent both as future practitioners and clinical or basic science investigators.
- Explicit and measurable research-related curricular outcomes should be articulated.
- Curricula should be designed with ample opportunity to engage in research. Specifically targeted teaching and learning activities can be used to develop research skills and attributes in undergraduate students. Such opportunities should encourage active involvement and be contextualised within the medical curriculum.
- Independent learning activities are vital to the development of research-orientated and research-aware students. Independent research projects can provide such awareness.
- Anticipating barriers to research teaching linkages and considering ways to deal with them are both important and must be taken into account when developing the undergraduate curriculum.

Correspondence: Prof. Simon Guild, Medical School, University of St Andrews, Medical and Biological Sciences Building, St Andrews KY16 9TF, UK. Tel: 01334 463 533; fax: +44 (0) 1334 467 470; email: sbg@st-and.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/12/090754–16 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.704438

2012, e1–e12, Early Online MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Grounded theory in medical education research: AMEE Guide No. 70

CHRISTOPHER J. WATLING & LORELEI LINGARD
Western University, Canada

Abstract

Qualitative research in general and the grounded theory approach in particular, have become increasingly prominent in medical education research in recent years. In this Guide, we first provide a historical perspective on the origin and evolution of grounded theory. We then outline the principles underlying the grounded theory approach and the procedures for doing a grounded theory study, illustrating these elements with real examples. Next, we address key critiques of grounded theory, which continue to shape how the method is perceived and used. Finally, pitfalls and controversies in grounded theory research are examined to provide a balanced view of both the potential and the challenges of this approach. This Guide aims to assist researchers new to grounded theory to approach their studies in a disciplined and rigorous fashion, to challenge experienced researchers to reflect on their assumptions, and to arm readers of medical education research with an approach to critically appraising the quality of grounded theory studies.

Introduction

The last several years have witnessed a gradual increase in the use and acceptance of qualitative methods of inquiry in medical education research. This trend reflects a growing recognition that some of the most pressing, relevant, and important questions in the field cannot be satisfactorily explored using the experimental and quantitative research methods that have traditionally dominated the biomedical domain. Among the multitude of qualitative methods available to the researcher, grounded theory has been the approach most frequently used in both the biomedical and social science realms (Harris 2003). With the increasing prominence of the grounded theory method in medical education research, it has become necessary for researchers and readers alike to have a clear grasp of its potential, its principles, and its pitfalls.

In this Guide, we will offer first an important historical perspective on the origin and evolution of grounded theory. We will then elaborate the key tenets of the grounded theory method – the elements that need to be present in order for a study to call itself a grounded theory study. Although these historical and procedural aspects of grounded theory have been well described by others (Kennedy & Lingard 2006), a guide to grounded theory must begin here, in order to adequately equip readers with the background they will require to do, or to critically evaluate, grounded theory research. This Guide will then build on previous literature on the use of the method in medical education research by examining important critiques that have been aimed at grounded theory and exploring some of the controversies and potential pitfalls that will face researchers. The grounded theory method, and indeed the discourse around knowledge generation, has evolved significantly over the forty-five years since grounded theory was first described. An evolving method deserves a periodic revisiting of its strengths and vulnerabilities so that it can be utilized thoughtfully and for maximum impact by researchers, and this Guide aims to serve this purpose.

Practice points

- Grounded theory has emerged from its origins in 1960s sociology to take an important place in medical education research.
- The grounded theory method is appropriate for exploratory research, especially that which explores social processes. Its intent is the development of a theory, "grounded" in the data, which enables understanding of the process under study.
- Fundamental elements of the grounded theory approach include an iterative process, theoretical sampling, and data analysis using the method of constant comparison.
- Constructivist critiques of a fundamental notion of grounded theory – that theory can "emerge" from data – have led to a reimagining of grounded theory where the roles of the researcher and the research participants in knowledge construction are acknowledged.
- Researchers should reflect on the important critiques of and controversies around grounded theory to facilitate making appropriate analytic choices.

Correspondence: Christopher J. Watling, Associate Dean, Postgraduate Medical Education, Schulich School of Medicine and Dentistry, Medical Sciences Building Room M103, Western University, London, Ontario N6A 5C1, Canada. Tel: 519-661-2019; fax: 519-850-2492; email: chris.watling@schulich.uwo.ca

ISSN 0142–159X print/ISSN 1466–187X online/12/10001–12 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.704439

2012; 34: 683–697 MEDICAL TEACHER

AMEE GUIDE

A systemic framework for the progress test: Strengths, constraints and issues: AMEE Guide No. 71

WILLIAM WRIGLEY, CEES PM VAN DER VLEUTEN, ADRIAN FREEMAN & ARNO MUIJTJENS

Department of Educational Development and Research, The Netherlands

Abstract

There has been increasing use and significance of progress testing in medical education. It is used in many ways and with several formats to reflect the variety of curricula and assessment purposes. These developments have occurred alongside a recognised sensitivity for error variance inherent in multiple choice tests from which challenges to its validity and reliability have arisen. This Guide presents a generic, systemic framework to help identify and explore improvements in the quality and defensibility of progress test data. The framework draws on the combined experience of the Dutch consortium, an individual medical school in the United Kingdom, and the bulk of the progress test literature to date. It embeds progress testing as a quality-controlled assessment tool for improving learning, teaching and the demonstration of educational standards. The paper describes strengths, highlights constraints and explores issues for improvement. These may assist in the establishment of potential or new progress testing in medical education programmes. They can also guide the evaluation and improvement of existing programmes.

Introduction

The introduction of problem-based learning (PBL) as a new educational philosophy in health sciences education began in the early 1970's in Canada at McMasters University and soon after at Maastricht Medical School in the Netherlands. This change brought the need for new methods to assess knowledge that were consistent with the PBL tenets of student-directedness, and deep and life-long learning, and which avoided the encouragement of rote and test-directed learning that were recognised to accompany traditional multiple-choice testing (van der Vleuten et al. 1996). This impetus resulted in the introduction of the progress test of applied medical knowledge in the late 1970s at both Maastricht University and the University of Missouri independently. Since then, it has been increasingly used in medical programs across the globe. A recent survey showed that this longitudinal, multiple choice question (MCQ) assessment tool has been introduced on all continents except Antarctica, involving such diverse regions as Southern Africa, Asia, several countries in Europe, the Middle East, North and South America, and in New Zealand and Australia (Freeman et al. 2010b).

For an assessment tool in medical education, the progress test offers some distinctive characteristics that set it apart from other types of assessment. It is usually administered to all students in the medical programme at the same time and at regular intervals (usually twice to four times yearly) throughout the entire academic programme. The test samples the complete knowledge domain expected of medical students on completion of their course, regardless of the year level of the student. The resultant scores provide longitudinal, repeated measures, curriculum-independent assessment of the objectives (in knowledge) of the entire medical programme. (van der Vleuten et al. 1996). These features enable the progress test to serve several important functions in medical programmes.

Considerable empirical evidence from medical schools in the Netherlands, Canada, United Kingdom and Ireland, as well postgraduate medical studies and schools in dentistry and psychology have shown that the longitudinal feature of the progress test provides a unique and demonstrable measurement of the growth and effectiveness of students' knowledge

Practice points

- Local, national and international progress testing is increasing worldwide.
- The inclusion of the progress test in the assessment regimes of medical and other health profession faculties offers several important advantages and benefits.
- A need for improved consistency and uniformity in progress testing can help improve the quality and defensibility of its data. This is suggested by evidence for significant error variance in multiple choice tests.
- Based on lengthy experience and empirical evidence from a review of the literature, a generic, systemic framework is presented in order to assist progress test practitioners to examine ways to improve consistency and uniformity.
- The strengths, constraints and issues of the parts of each component of the framework are examined and conclusions are drawn.

Correspondence: C.P.M. van der Vleuten, P.O. Box 616, 6200 MD Maastricht, The Netherlands. Tel: +31 (0) 43 388 5726; fax: +31 (0) 388 5779; email: c.vandervleuten@maastrichtuniversity.nl

ISSN 0142-159X print/ISSN 1466-187X online/12/090683-15 © 2012 Informa UK Ltd.
DOI: 10.3109/0142159X.2012.704437

2014, 36: 557–572

AMEE GUIDE

Electives in undergraduate medical education: AMEE Guide No. 88

ANDREW LUMB[1] & DEBORAH MURDOCH-EATON[2]
[1]University of Leeds, UK and [2]University of Sheffield, UK

Abstract

This Guide outlines the scope and potential roles an elective can contribute to undergraduate medical training and identifies ways to maximize learning opportunities, including within global health. The types of educational activity available for electives range from meeting individual educational need through to exploration of potential career pathways, with many factors influencing choice. Key areas of organization underpinning a successful elective before, during and after the placement include developing clarity of the intended educational outcomes as well as addressing practicalities such as travel and accommodation. Risk management including the implications for the participating schools as well as the student and their elective supervisors is crucial. This Guide would not be complete without some discussion around ethics and professional conduct during an elective, with consideration of the impact of elective placements, particularly in low-middle income countries.

Introduction

Background to the elective in undergraduate medical education

There is no standard definition of an "elective". The term can be used to describe many widely differing curricular elements, but usually infers a period of time during undergraduate training within which there is a significant element of student choice. The conceptual role of electives and workplace based attachments within university education generally, and their influence on employability of graduates, is increasingly recognized (Bullock et al. 2012; Wilton 2012). Placements are commonly included within undergraduate higher education programmes, not only outside the university setting, e.g. in industry or the future workplace, but additionally recognition of the benefit of broadening minds is addressed through provision of optional study modules outside of the main field of study. This reminds medical education of the importance of flexibility within the type of electives included as curricular components within most undergraduate medical programmes (Dowell & Merrylees 2009).

International electives are commonly a part of curricula of medical schools in developed countries, e.g. a compulsory elective exists in all medical schools responding to surveys in Australia (Law et al. 2013) and UK (Miranda et al. 2005) and in 16 of 17 schools in Canada (Izadnegahdar et al. 2008). There is, however, wide variation between schools on what constitutes an elective; e.g. in Canadian schools international electives vary from optional modules of a few weeks duration to a separate two-year course (Izadnegahdar et al. 2008). Student Selected Components (SSCs) have a broader educational remit within the overall undergraduate programme (Murdoch-Eaton et al. 2004), usually encompassing a sequence of optional choices across the whole period of study. The commonality is the underpinning element of student choice over what is studied, and thus many SSC programmes may include the elective within their management or evaluation of this programme element. While SSCs are often included within undergraduate medical training in most countries, e.g. in terms of some element of student influence over what is studied, we are not aware of any data on the number of medical courses in resource poor countries that include an elective.

Despite involving (usually) several weeks of the curriculum, electives have tended to remain comparatively less well-monitored, regulated, less well-reported, and thus potentially of variable educational benefit. In many medical schools, they remain largely untouched by significant educational innovations and practice seen in the approach to other curricular

Practice points

- Electives provide unique opportunities for students to design and organize individualized educational experiences.
- Maximizing educational benefit requires clearly defined and realistic educational outcomes.
- Ethical challenges and considerations should be an integral part of required professional elective practice.
- International electives expose students to greater risks than when at home and thorough pre-departure preparation should include risk management.
- Establishing mutually beneficial partnerships between home medical schools and the elective providers are an ideal aspirational elective model.

Correspondence: Prof. Deborah Murdoch-Eaton, The Medical School, University of Sheffield, Beech Hill Road, Sheffield S10 2RX, UK. Tel: +44 114 222 5546; E-mail: d.murdoch-eaton@sheffield.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/070557–16 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.907987

2014, 36: 657–674

AMEE GUIDE

Medical education scholarship: An introductory guide: AMEE Guide No. 89

GERALD E. CRITES[1], JULIE K. GAINES[1], SCOTT COTTRELL[2], SUMMERS KALISHMAN[3], MARYELLEN GUSIC[4], BRIAN MAVIS[5] & STEVEN J. DURNING[6]

[1]GRU/UGA Medical Partnership, USA, [2]WVU, USA, [3]University of New Mexico, USA, [4]Indiana University School of Medicine, USA, [5]Michigan State University, USA, [6]Uniformed Services University of the Health Sciences, USA

Abstract

This AMEE Guide provides an overview of medical education scholarship for early career scholars, based upon a summary of the existing literature and pragmatic advice derived from the experience of its authors. After providing an introduction to the principles of scholarship and describing questions that the Guide addresses, the authors offer a conceptual description of the complementary traditions of teaching and educational discovery, and advocate for the development of educational scholars with both traditions. They then describe the attributes of effective mentor–mentee relationships and how early career scholars can identify potential mentors who can fulfill this role. In the subsequent sections, they describe the appropriate development of scholarly questions and other components of a complete scholarly plan, including how to use conceptual frameworks in guiding such plans. From here, they describe methods that align with both the teaching and discovery traditions and provide concrete examples of each. They then provide guidelines for assessing the impact of scholarship, identify the various opportunities for sharing it, and how to effectively interpret and describe it. Additionally, they provide practical advice on how appropriately to demonstrate the scholarship in a promotional packet, including the principle of reflectivity in scholarship. Finally, they address the principles of applied research ethics for educational scholarship and when to consider soliciting approval for scholarly activities by a human research board.

Introduction

In the AAMC's classic 2000 special issue on *Expanding the View of Scholarship*, a group of international scholars from the Council of Academic Societies (CAS) published a series of articles advocating a broader view of scholarship as it relates to Boyer's original classification: The Scholarship of Discovery (research, including educational research), the Scholarship of Application, the Scholarship of Integration and the Scholarship of Teaching (Boyer 1990; Beattie 2000). In the series, the authors maintained that all high-quality scholarship must address six core principles: clear goals, adequate preparation, appropriate methods, significant results, effective presentation and reflective critique (Glassick 2000). These scholars advocated a valuation and promotion system within medical schools that equally weigh the four types of scholarship (Bordage et al. 2001).

Despite the growing acceptance of these four types of scholarship in academic institutions, a few lingering questions remain about the differences between educational discovery and other forms of scholarship, particularly teaching scholarship. Furthermore, relatively few resources address the practical issues related to implementing scholarly activities and how to grow an academic career from such activities.

Practice points

- All scholarship should be guided and judged by Glassick's six core principles of excellence for scholarship.
- The educational discovery (research) and teaching scholarly traditions are based upon different assumptions and utilize different methods, but they address similar educational questions and goals and are equally important for the development of educational scholars.
- Educational scholars should carefully articulate their goals by formulating thoughtful questions and select appropriate methodologies to address these questions.
- Successful scholars purposefully design and implement their scholarly activities and early career scholars should seek guidance of mentors for these activities.
- Effective scholars accurately interpret their scholarship's scope and impact and understand how to appropriately present its results.
- Some educational scholarly activities fall under research subject protections and therefore may require review by a human research board (IRB).

Correspondence: Gerald E. Crites, MD, MEd, Associate Professor of Medicine, GRU-UGA Medical Partnership, 108 Spear Road, Winnie Davis Hall-209, Athens, GA 30602, USA. Tel: +706 713 2192; Fax: +706 713 2222; E-mail: gcrites@uga.edu

ISSN 0142-159X print/ISSN 1466-187X online/14/080657–18 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.916791

2014, 36: 746–756

AMEE GUIDE

Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part I

MOHSEN TAVAKOL[1] & JOHN SANDARS[2]

[1]The University of Nottingham, UK, [2]The University of Leeds, UK

Abstract

Medical educators need to understand and conduct medical education research in order to make informed decisions based on the best evidence, rather than rely on their own hunches. The purpose of this Guide is to provide medical educators, especially those who are new to medical education research, with a basic understanding of how quantitative and qualitative methods contribute to the medical education evidence base through their different inquiry approaches and also how to select the most appropriate inquiry approach to answer their research questions.

Introduction

Over the past few decades, major advances have occurred in both the understanding and practice of medical education. Medical education research has contributed considerably to these advances by adding reliable new knowledge to an existing body of educational knowledge to produce 'best evidence' that can help medical educators to make better decisions about important areas of medical education, such as teaching and learning, effective curriculum design and assessment. Through research, data can be collected and analysed to better understand the teaching and learning process (Norman 2002) and also to inform decision making about how well a particular programme, practice, procedure or policy is operating (Tavakol & Gruppen 2010). However, there is often little interest by clinicians in medical education research, possibly as a result of a lack of training in education research methods, and with many clinical educators also feeling less confident in the application of qualitative research approaches (Tavakol et al. 2008). This could be due to the fact that the nature of qualitative studies in comparison with quantitative methods has not been recognised (Morse 2005), especially since medical educators tend to gather empirical data that are grounded in objective rather than subjective reality (Buckley 1998). However, the contribution of qualitative studies in evidence-based practice has increasingly been recognised in both healthcare systems and educational research (McEwan et al. 2004; Ong & Richardson 2006; Bower & Scambler 2007).

The purpose of this Guide is to provide medical educators, especially those who are new to medical education research, with a basic understanding of how quantitative and qualitative methods contribute to the medical education evidence base through their different inquiry approaches. It also provides readers with the primary steps of the research process and an understanding of how to select the most appropriate inquiry approach to answer their research questions

Practice points

- Quantitative and qualitative studies are not contradictory, but complementary. Both develop new knowledge for solving research problems.
- Quantitative research has a positivist paradigm, in which the world to be researched is viewed as an objective reality, but qualitative research has a naturalistic paradigm, in which the world to be researched is viewed as a socially constructed subjective reality.
- Qualitative research provides an opportunity to generate and explain models and theories inductively, whereas quantitative research provides an opportunity to test theories deductively.
- When there is little knowledge about the phenomenon of interest, qualitative approaches are suggested to explore and understand the phenomenon.
- In quantitative research, the accuracy of the research results depends on the validity and reliability of the measurement tools, whereas in qualitative research the trustworthiness of the research findings heavily relies on the researcher as a tool, and hence participants should verify their findings.
- Quantitative researchers rely on numerical values obtained from statistical procedures and their corresponding p values, whereas qualitative researchers rely on excerpts from the actual voice of participants to describe and support the identified themes.
- All research must consider essential ethical principles to ensure that participants are not harmed, either in the process of data collection or by the presentation of results.

Correspondence: Dr. Mohsen Tavakol, Medical Education Unit, University of Nottingham, Nottingham NG7 2UH, UK. Tel: +44(0)115 823 0014; E-mail: mohsen.tavakol@nottingham.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/090746–11 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.915298

2014, 36: 746–756

AMEE GUIDE

Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part I

MOHSEN TAVAKOL[1] & JOHN SANDARS[2]

[1]The University of Nottingham, UK, [2]The University of Leeds, UK

Abstract

Medical educators need to understand and conduct medical education research in order to make informed decisions based on the best evidence, rather than rely on their own hunches. The purpose of this Guide is to provide medical educators, especially those who are new to medical education research, with a basic understanding of how quantitative and qualitative methods contribute to the medical education evidence base through their different inquiry approaches and also how to select the most appropriate inquiry approach to answer their research questions.

Introduction

Over the past few decades, major advances have occurred in both the understanding and practice of medical education. Medical education research has contributed considerably to these advances by adding reliable new knowledge to an existing body of educational knowledge to produce 'best evidence' that can help medical educators to make better decisions about important areas of medical education, such as teaching and learning, effective curriculum design and assessment. Through research, data can be collected and analysed to better understand the teaching and learning process (Norman 2002) and also to inform decision making about how well a particular programme, practice, procedure or policy is operating (Tavakol & Gruppen 2010). However, there is often little interest by clinicians in medical education research, possibly as a result of a lack of training in education research methods, and with many clinical educators also feeling less confident in the application of qualitative research approaches (Tavakol et al. 2008). This could be due to the fact that the nature of qualitative studies in comparison with quantitative methods has not been recognised (Morse 2005), especially since medical educators tend to gather empirical data that are grounded in objective rather than subjective reality (Buckley 1998). However, the contribution of qualitative studies in evidence-based practice has increasingly been recognised in both healthcare systems and educational research (McEwan et al. 2004; Ong & Richardson 2006; Bower & Scambler 2007).

The purpose of this Guide is to provide medical educators, especially those who are new to medical education research, with a basic understanding of how quantitative and qualitative methods contribute to the medical education evidence base through their different inquiry approaches. It also provides readers with the primary steps of the research process and an understanding of how to select the most appropriate inquiry approach to answer their research questions

Practice points

- Quantitative and qualitative studies are not contradictory, but complementary. Both develop new knowledge for solving research problems.
- Quantitative research has a positivist paradigm, in which the world to be researched is viewed as an objective reality, but qualitative research has a naturalistic paradigm, in which the world to be researched is viewed as a socially constructed subjective reality.
- Qualitative research provides an opportunity to generate and explain models and theories inductively, whereas quantitative research provides an opportunity to test theories deductively.
- When there is little knowledge about the phenomenon of interest, qualitative approaches are suggested to explore and understand the phenomenon.
- In quantitative research, the accuracy of the research results depends on the validity and reliability of the measurement tools, whereas in qualitative research the trustworthiness of the research findings heavily relies on the researcher as a tool, and hence participants should verify their findings.
- Quantitative researchers rely on numerical values obtained from statistical procedures and their corresponding p values, whereas qualitative researchers rely on excerpts from the actual voice of participants to describe and support the identified themes.
- All research must consider essential ethical principles to ensure that participants are not harmed, either in the process of data collection or by the presentation of results.

Correspondence: Dr. Mohsen Tavakol, Medical Education Unit, University of Nottingham, Nottingham NG7 2UH, UK. Tel: +44(0)115 823 0014; E-mail: mohsen.tavakol@nottingham.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/090746–11 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.915298

2014, 36: 838–848

AMEE GUIDE

Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part II

MOHSEN TAVAKOL[1] & JOHN SANDARS[2]

[1]The University of Nottingham, UK, [2]The University of Leeds, UK

Abstract

Medical educators need to understand and conduct medical education research in order to make informed decisions based on the best evidence, rather than rely on their own hunches. The purpose of this Guide is to provide medical educators, especially those who are new to medical education research, with a basic understanding of how quantitative and qualitative methods contribute to the medical education evidence base through their different inquiry approaches and also how to select the most appropriate inquiry approach to answer their research questions.

Introduction

In Part I of this Guide, we discussed the importance of quantitative and qualitative research methods in medical education research. The understanding of the knowledge construction process, from a positivist and naturalist point of view, has been discussed. We highlighted how quantitative and qualitative studies are not contradictory, but complementary. In Part I, we discussed different quantitative research designs to conduct a medical education research study.

The purpose of Part II is to discuss the remaining steps of the research process and we begin with qualitative research designs.

Qualitative research designs

Because qualitative research methods are based upon totally different epistemological and ontological assumptions compared to quantitative research methods, they have different methods to capture the perspectives of participants. Qualitative methods do not have independent and dependent variables, nor do they test a hypothesis or a treatment effect. Qualitative researchers follow the process of 'bracketing', meaning that they need to put aside their own ideas and personal views about the phenomenon being studied. If we do not set aside our own ideas about the research topic, we are less likely to observe experience from the lens of the participants who have lived the experience (Gillis & Jackson 2002). However, researchers cannot easily put aside things which they are unaware and it is essential that they can explore their personal feelings, beliefs and preconceived ideas before doing every step of the research process (e.g. literature review, study design, sampling, data collection, data analysis and interpretation of results). This process of 'bracketing' that is used by researchers is called reflexivity. Researchers can keep a reflexive journal to record and explore how their values

Practice points

- Quantitative and qualitative studies are not contradictory, but complementary. Both develop new knowledge for solving research problems.
- Quantitative research has a positivist paradigm, in which the world to be researched is viewed as an objective reality, but qualitative research has a naturalistic paradigm, in which the world to be researched is viewed as a socially constructed subjective reality
- Qualitative research provides an opportunity to generate and explain models and theories inductively, whereas quantitative research provides an opportunity to test theories deductively.
- When there is little knowledge about the phenomenon of interest, qualitative approaches are suggested to explore and understand the phenomenon.
- In quantitative research, the accuracy of the research results depends on the validity and reliability of the measurement tools, whereas in qualitative research the trustworthiness of the research findings heavily relies on the researcher as a tool, and hence participants should verify their findings.
- Quantitative researchers rely on numerical values obtained from statistical procedures and their corresponding *p* values, whereas qualitative researchers rely on excerpts from the actual voice of participants to describe and support the identified themes.
- All research must consider essential ethical principles to ensure that participants are not harmed, either in the process of data collection or by the presentation of results.

Correspondence: Dr. Mohsen Tavakol, Medical Education Unit, University of Nottingham, Nottingham NG7 2UH, UK. Tel: +44(0)115 823 0014; E-mail: mohsen.tavakol@nottingham.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/100838–11
DOI: 10.3109/0142159X.2014.915297

2014, 36: 923–939

AMEE GUIDE

Using focus groups in medical education research: AMEE Guide No. 91

RENÉE E. STALMEIJER[1], NANCY MCNAUGHTON[2] & WALTHER N. K. A. VAN MOOK[1,3]

[1]Maastricht University, the Netherlands, [2]University of Toronto, Canada, [3]Maastricht University Medical Centre, the Netherlands

Abstract

Qualitative research methodology has become an established part of the medical education research field. A very popular data-collection technique used in qualitative research is the "focus group". Focus groups in this Guide are defined as "*... group discussions organized to explore a specific set of issues ... The group is focused in the sense that it involves some kind of collective activity ... crucially, focus groups are distinguished from the broader category of group interview by the explicit use of the group interaction as research data*" (Kitzinger 1994, p. 103). This Guide has been designed to provide people who are interested in using focus groups with the information and tools to organize, conduct, analyze and publish sound focus group research within a broader understanding of the background and theoretical grounding of the focus group method. The Guide is organized as follows: Firstly, to describe the evolution of the focus group in the social sciences research domain. Secondly, to describe the paradigmatic fit of focus groups within qualitative research approaches in the field of medical education. After defining, the nature of focus groups and when, and when not, to use them, the Guide takes on a more practical approach, taking the reader through the various steps that need to be taken in conducting effective focus group research. Finally, the Guide finishes with practical hints towards writing up a focus group study for publication.

Introduction

Qualitative methodology is well established in the field of medical education research. A popular data-collection technique used in qualitative research is the "focus group", originally called "focused group interview" which was initially described by Merton & Kendall (1946).

Focus groups in this Guide are defined as:

> *... group discussions organized to explore a specific set of issues ... The group is focused in the sense that it involves some kind of collective activity ... crucially, focus groups are distinguished from the broader category of group interview by the explicit use of the group interaction as research data* (Kitzinger 1994, p. 103).

While the focus group method is among the most commonly used approaches, within health professions education research it is often used poorly or not well understood. Several excellent books, manuals and reference materials on focus groups are already available (e.g. Barbour 2007; Stewart et al. 2007; Krueger & Casey 2009) aiming at different groups of readers. References to some of this material are made in this Guide, and readers may find their content complementary and useful in addition to the information conveyed herein.

Practice points

- Focus groups are a form of group interview that capitalizes on communication between research participants in order to generate data.
- Focus groups can be used to both explore and explain certain (social) phenomena in medical education.
- The number of focus groups depends on the amount of information that needs to be gathered; the optimum number of participants within a focus group is 8.
- The moderator can take on various roles to stimulate the discussion within a focus group.
- A questioning route is an important tool in getting rich information from the focus group.
- In analyzing focus group data, attention should also be paid to the interaction between participants and differences in the discussions between groups.
- Publishing focus group data should be imbedded within a deeper understanding of qualitative methodology and its guiding principles.

Focus groups in medical education

As described by Barbour (2005), the acceptance of focus groups as a research method within the field of medical education has run parallel with the more general acceptance of

Correspondence: Dr. Renée E. Stalmeijer, Department of Educational Development and Research, Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, The Netherlands. Tel: +31 43 388 57 35; Fax: +31 43 388 57 79; E-mail: r.stalmeijer@maastrichtuniversity.nl

ISSN 0142-159X print/ISSN 1466-187X online/14/110923–17 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.917165

2014, 36: 1015–1026

AMEE GUIDE

Developmental student support in undergraduate medical education: AMEE Guide No. 92

JOHN SANDARS[1], RAKESH PATEL[2], HELEN STEELE[3] & MARTIN MCAREAVEY[3]

[1]The University of Sheffield, UK [2]University of Leicester, UK, [3]University of Leeds, UK

Abstract

Developmental student support has a focus on developing the whole person, not only academic and clinical competence. The positive and proactive developmental approach is in marked contrast to the deficit and reactive approach to student support which only targets identified students who are considered to be "at risk". The medical school is a nexus for personal development, combining the personal identity formation journey of early adulthood with the variety of new experiences in medical school. Important aspects of developmental student support are the development of resilience and ensuring reasonable adjustments for students with learning difficulties and disabilities. Careers guidance is an essential aspect of developmental student support, including students with doubts about a career in medicine and who are leaving because of poor performance. Developmental student support requires an organizational culture in which student support is considered as the responsibility of everyone, with further support from named personal tutors.

Introduction

This Guide has a focus on developmental student support in undergraduate medical education, with learners who are mainly in the age group from late adolescence to early adulthood. We describe the approach to developmental student support that has been implemented in the School of Medicine at the University of Leeds and the University of Leicester and, as an example, we hope that all medical educators will find aspects of our approach relevant to their own context, including supporting doctors in training and continuing professional development.

In the UK, The General Medical Council (GMC) (2009) sets standards for undergraduate medical education and clearly states that there should be separate systems for managing student performance issues and providing student support. Student performance issues, such as failing examinations or investigating plagiarism, have immediate relevance to the future assessment of competence to practice but student support has a wider and more developmental perspective that considers how each student can achieve their individual potential, both as a person and as a future healthcare professional. The important dimensions of student support are academic and personal, with a recognition that these dimensions are closely integrated.

The discussions at Leeds and Leicester have focused on a developmental perspective for student support. This perspective has been informed by various theories on student development and also from sociological theories that have a positive approach to diversity. The developmental perspective of student support is to develop the whole person and not merely whether they can acquire a certain standard of academic or clinical competence. An essential aspect of medical school is to ensure that the graduate is fit for practice but there is an essential personal growth aspect that occurs over the life-time of an individual, from "womb to tomb". The time at medical school, from entry to departure, is only

Practice points

- Developmental student support has a focus on developing the whole person, not only academic and clinical competence.
- The medical school is a nexus for personal development, combining the personal identity formation journey of early adulthood with the variety of new experiences in medical school.
- Important aspects of developmental student support are the development of resilience and ensuring reasonable adjustments for students with learning difficulties and disabilities.
- Careers guidance is an essential aspect of developmental student support, including students with doubts about a career in medicine and who are leaving because of poor performance.
- Developmental student support requires an organizational culture in which student support is considered as the responsibility of everyone, with further support from named personal tutors.

Correspondence: Professor John Sandars, Academic Unit of Medical Education, Medical School, The University of Sheffield, Beech Hill Road, Sheffield S10 2RX, UK. Tel: +44 0 114 222 5341; E-mail: j.e.sandars@sheffield.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/121015–12 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.917168

2015, 37: 4–20

AMEE GUIDE

4C/ID in medical education: How to design an educational program based on whole-task learning: AMEE Guide No. 93

MIEKE VANDEWAETERE[1], DOMINIQUE MANHAEVE[1], BERT AERTGEERTS[1], GERALDINE CLAREBOUT[1], JEROEN J. G. VAN MERRIËNBOER[2] & ANN ROEX[1]

[1]University of Leuven, Belgium, [2]Maastricht University, the Netherlands

Abstract

Medical education increasingly stresses that medical students should be prepared to take up multiple roles as a health professional. This requires the integrated acquisition of multiple competences such as clinical reasoning and decision making, communication skills and management skills. To promote such complex learning, instructional design has focused on the use of authentic, real-life learning tasks that students perform in a real or simulated task environment. The four-component instructional design model (4C/ID) model is an instructional design model that starts from the use of such tasks and provides students with a variety of learning tools facilitating the integrated acquisition of knowledge, skills and attitudes. In what follows, we guide the reader on how to implement educational programs based on the 4C/ID model and illustrate this with an example from general practice education. The developed learning environment is in line with the whole-task approach, where a learning domain is considered as a coherent, integrated whole and where teaching progresses from offering relatively simple, but meaningful, authentic whole tasks to more complex tasks. We describe the steps that were taken, from prototype over development to implementation, to build five learning modules (patient with diabetes; the young child with fever; axial skeleton; care for the elderly and physically undefined symptoms) that all focus on the integrated acquisition of the Canadian Medical Education Directives for Specialists roles in general practice. Furthermore, a change cycle for educational innovation is described that encompasses practice-based challenges and pitfalls about the collaboration between different stakeholders (students, developers and teachers) and the transition from traditional, fragmented and classroom-based learning to integrated and blended learning based on sound instructional design principles.

Introduction

There is a general agreement that medical curricula should be outcome- and competency-based (Fernandez et al. 2012). This implies that the primary goal of modern medical education is to train students to become competent physicians (competency-based medical education or CBME). Inspired by this idea, many fruitful attempts have been made on how to define medical competence. Using national training frameworks such as Canadian Medical Education Directives for Specialists (CanMEDS; Frank & Danoff 2007), Accreditation Council for Graduate Medical Education (Swing 2007) and the Dundee Outcomes (Davis 2003), curricula in medical education can be organized according to competency-linked outcome expectations and standards that should be met by the learners. Because the CanMEDS framework is used as the backbone for the medical education curriculum at the University of Leuven in Belgium, this framework was also used for the development of the learning environment described in this Guide.

The CanMEDS 2005 Physician Competency Framework (Frank 2005) is an internationally used definition that describes how physicians should integrate their roles (as medical expert, communicator, collaborator, academic, organizer, health promoter and professional) in order to apply their knowledge, skills and professional attitudes to provide patient-centered care. In practice, the roles as described in the CanMEDS framework have to be integrated into a seamless whole,

Practice points

- Innovation in medical education is a cyclical process of change and stepwise improvement.
- Whole-task learning in medical education requires strong collaboration between developers and end-users.
- End-users of medical innovation are both students and teachers as well.
- The 4C/ID model is an instructional design model that guides the design of whole-task based learning environments.
- By following 10 concrete steps, medical courses and curricula can be transformed into powerful whole-task-based learning environments.

Correspondence: Dr. Mieke Vandewaetere, KU Leuven @ Kulak, E. Sabbelaan 53, 8500 Kortrijk, Belgium. Tel: 0032 56 24 60 94; E-mail: mieke.vandewaetere@kuleuven-kulak.be

ISSN 0142-159X print/ISSN 1466-187X online/15/010004–17 © 2015 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.928407

2014, 1–17, Early Online MEDICAL TEACHER

AMEE GUIDE

Systematic reviews in medical education: A practical approach: AMEE Guide 94

RICHA SHARMA[1], MORRIS GORDON[2], SHARIK DHARAMSI[1] & TREVOR GIBBS[3]
[1]University of British Columbia, Canada, [2]University of Central Lancashire, UK, [3]AMEE, UK

Abstract

The twentieth century saw a paradigm shift in medical education, with acceptance that 'knowledge' and 'truth' are contextual, in flux and always evolving. The twenty-first century has seen a greater explosion in computer technology leading to a massive increase in information and an ease of availability, both offering great potential to future research. However, for many decades, there have been voices within the health care system raising an alarm at the lack of evidence to support widespread clinical practice; from these voices, the concept of and need for evidence-based health-care has grown. Parallel to this development has been the emergence of evidence-based medical education; if healthcare is evidence-based, then the training of practitioners who provide this healthcare must equally be evidence-based. Evidence-based medical education involves the systematic collection, synthesis and application of all available evidence, when available, and not just the opinion of experts. This represented a seismic shift from a position of expert based consensus guidance to evidence led guidance for evolving clinical knowledge. The aim of this guide is to provide a practical approach to the development and application of a systematic review in medical education; a valid method used in this guide to seek and substantiate the effects of interventions in medical education.

Introduction

The origins of medical education were grounded in the practice of apprenticeship as long as two millennia ago, with knowledge viewed as a commodity to be delivered directly to the learner (Drabkin 1957). This knowledge could develop as expertise, but essentially was seen as 'truth' to be transmitted to learners. The twentieth century saw a paradigm shift in this viewpoint, with acceptance that 'knowledge' and 'truth' are contextual, in flux and always evolving (Sackett et al. 1996). The technology explosion has led to a general ease of access to the massive increase in information, not only offering great potential but also inordinate risk (Altman 1994). The most prominent concern raised by doctors since the outset of this revolution has been the poor quality of much of the available information (Shactman 2000) and for many decades, there have been voices within health care raising alarm at the lack of evidence to support widespread clinical practice (Mulrow 1987; Sackett & Rosenberg 1995) The thousands of irrelevant studies that appear using an online search has led to the 'fool's gold of the digital age' (Gordon et al. 2013a). There is an even greater challenge in the field of medical education, where multiple research methodologies are used by scholars from ideologically polarised backgrounds to answer the same question (Cresswell et al. 2010). All this has led to the evidence-based medicine movement, which originated at the McMaster University in Canada where it was defined as 'the conscientious, explicit and judicial use of current evidence in making decisions about the care of individual patients' (Sackett et al. 1996).

Practice points

- Evidence to support, refute or guide effective medical education increases at an inexorable rate.
- Much of the data describing the newer approaches to healthcare and the education of doctors are not always bound in evidence or validity, and frequently the findings are not always transferable to other educational situations.
- There is a need to have a logical approach to gathering the educational research data and setting it out so that it becomes an effective tool in the educational researcher's toolbox.
- A medical education systematic review is an effective research tool but requires a dedicated approach, based upon a series of accepted steps to development.

Evidence-based health care involves the systematic collection, synthesis and application of all available evidence, when available, not just the opinion of experts (Moher et al. 1999). This represented a seismic shift from a position of expert-based consensus guidance to evidence led guidance for evolving clinical knowledge (Burgers et al. 2003). The most important element of the evidence-based health care movement is an acceptance of the evolving nature of 'truth'. Researchers have sought to quantify this, no more elegantly than Hall and Platell (1997). They demonstrated that the half-life of clinical truth in the surgical field is 45 years and therefore

Correspondence: Dr. Morris Gordon, School of Medicine and Dentistry, Harrington Building Room HA106, University of Central Lancashire, Fylde Road, Preston, Lancashire, PR1 2HE, UK. Tel: +44 (0)1253 303443; E-mail: morris@betterprescribing.com

ISSN 0142-159X print/ISSN 1466-187X online/14/000001–17 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.970998

2014, 1–17, Early Online MEDICAL TEACHER

AMEE GUIDE

Clinical diagnostic decision-making in real life contexts: A trans-theoretical approach for teaching: AMEE Guide No. 95

RAKESH PATEL[1,2], JOHN SANDARS[3] & SUE CARR[1,2]

[1]University of Leicester, UK, [2]University Hospitals of Leicester NHS Trust, UK, [3]University of Sheffield, UK

Abstract

Making an accurate clinical diagnosis is an essential skill for all medical students and doctors, with important implications for patient safety. Current approaches for teaching how to make a clinical diagnosis tend to lack the complexity that faces clinicians in real-life contexts. In this Guide, we propose a new trans-theoretical model for teaching how to make an appropriate clinical diagnosis that can be used by teachers as an additional technique to their current approach. This educational model integrates situativity theory, dual-information processing theory and socio-cognitive theory. Mapping and microanalysis help the teacher to identify the main processes involved in making an accurate clinical diagnosis, so that feedback can be provided that is focused on improving key aspects of the skill. An essential aspect of using the new educational model is the role of the experienced clinical teacher in making judgments about the appropriateness of the learner's attempts to make a clinical diagnosis.

Introduction

The importance of making a timely and accurate diagnosis is fundamental for safe clinical practice and preventing error (Croskerry 2003b). The task of making such a diagnosis involves doctors integrating key information from across all the stages of the clinical enquiry (including history taking, physical examination and investigations).

Making an appropriate clinical diagnosis is complex with several important factors affecting success of the task. The clinical environment has various distractors (such as time pressure and patient expectations) that may deflect the attention of clinicians. Clinical presentations also change with the passage of time and diagnoses made in the early stages of the patient's presentation may be, in part, inaccurate and require refining as more information comes to light. Patients suffering from multiple medical conditions present diagnostic challenges, since differentiating a 'true' new problem from their existing burden of chronic disease is complicated.

It is not surprising that the process of making a clinical diagnosis is a frequent cause of error in both primary and secondary care (Graber et al. 2005; Gandhi et al. 2006; Newman-Toker & Pronovost 2009). Nevertheless, making an appropriate clinical diagnosis remains fundamentally important for the patient since the outcome initiates a cascade of subsequent actions, such as prescribing a drug or performing an operation, with real-world consequences.

The challenge for all medical educators is how to develop the fundamental competence of making an appropriate clinical diagnosis in the context of real-life clinical practice among undergraduates and doctors in training so that they can avoid making an error (Wahner-Roedler et al. 2007). We consider that current educational methods for developing this ability rely on approaches that usually lack the actual complexity of making a diagnosis in the authentic clinical environment (Bowen 2006); in this Guide, we propose a new trans-theoretical educational model that we believe helps the student and the teacher. The aim of this new model is to provide a pragmatic approach that draws on different, but complementary theories, and provides a richer understanding

Practice points

- Making an accurate clinical diagnosis is an essential skill for all medical students and doctors, with important implications for patient safety.
- Current approaches for teaching how to make a clinical diagnosis tend to lack the complexity that faces clinicians in real-life contexts.
- A new trans-theoretical model for teaching how to make an appropriate clinical diagnosis integrates the situativity theory, the dual-information processing theory and the socio-cognitive theory.
- Mapping and microanalysis help the teacher to identify the main processes involved in making an accurate clinical diagnosis and enables feedback to be given that focuses on the key processes.
- An essential aspect of using the new educational model is the role of the experienced clinical teacher in making judgments about the appropriateness of the learner's attempts to make clinical diagnosis.

Correspondence: Rakesh Patel, Department of Medical and Social Care Education, University of Leicester, 107 Princess Road East, Leicester LE1 7LA, UK. Tel: +44 116 252 3668; E-mail: rp299@leicester.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/000001–17 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.975195

2014, 1–11, Early Online MEDICAL TEACHER

AMEE GUIDE

The integrated curriculum in medical education: AMEE Guide No. 96

DAVID G. BRAUER[1] & KRISTI J. FERGUSON[2]

[1]Washington University School of Medicine, USA, [2]University of Iowa, USA

Abstract

The popularity of the term "integrated curriculum" has grown immensely in medical education over the last two decades, but what does this term mean and how do we go about its design, implementation, and evaluation? Definitions and application of the term vary greatly in the literature, spanning from the integration of content within a single lecture to the integration of a medical school's comprehensive curriculum. Taking into account the integrated curriculum's historic and evolving base of knowledge and theory, its support from many national medical education organizations, and the ever-increasing body of published examples, we deem it necessary to present a guide to review and promote further development of the integrated curriculum movement in medical education with an international perspective. We introduce the history and theory behind integration and provide theoretical models alongside published examples of common variations of an integrated curriculum. In addition, we identify three areas of particular need when developing an ideal integrated curriculum, leading us to propose the use of a new, clarified definition of "integrated curriculum", and offer a review of strategies to evaluate the impact of an integrated curriculum on the learner. This Guide is presented to assist educators in the design, implementation, and evaluation of a thoroughly integrated medical school curriculum.

Introduction

As national medical education organizations, post-graduate training programs, and employers place ever-increasing scrutiny on preparing medical school graduates for large volumes of clinical work, medical school curricula around the world have undergone a major evolution in recent years. The historic Flexner report, "Medical Education in the United States and Canada" (1910), set forth many of the standards by which medical educations is shaped today, including the traditional "2 + 2" curricular structure in which two years of basic science are followed by two years of clinical science. Despite a century of evolution of the fund of knowledge in basic and clinical sciences as well as advancements in teaching strategies, this curriculum format still persists in many medical schools around the world, yet is viewed as an inadequate system to prepare future physicians for twenty-first Century medicine (Cooke et al. 2006; Irby et al. 2010). The rapid rise of and subsequent demand for providers to have expertise in areas such as population health, health policy, healthcare delivery systems, and interdisciplinary care has demanded that medical graduates possess knowledge and skills beyond a thorough understanding of applied anatomy and pathophysiology (Maeshiro et al. 2010). The Australian Medical Council (AMC) organizes the requirements for medical school graduation into four domains; traditional domains – "science and scholarship" and "clinical practice" – are now matched in emphasis with more

Practice points

- The Integrated Curriculum is becoming an increasingly popular concept internationally.
- The goal of integration is to break down barriers between the basic and clinical sciences currently in place as a result of traditional curricular structures.
- Integration should promote retention of knowledge and acquisition of skills through repetitive and progressive development of concepts and their applications.
- We suggest three areas in need of improvement and clarification for successful integration: ensuring synchronous presentation of material, avoiding the tendency to diminish the importance of the basic sciences, and using unified definitions.
- Goals and methods to evaluate whether the goals have been met are infrequently reported, utilized, and understood, limiting sustained success and growth of integrated curricula.
- We propose a unified definition of integrated curriculum and clarify definitions of common, less-comprehensive integrative strategies including "integrated courses" and "integrated clerkships".

Correspondence: David Brauer, Department of Surgery, Washington University School of Medicine, 660 South Euclid Avenue, Box 8109, Saint Louis, MO 63110, USA. Tel: + 1 (314) 362-8028; Fax: + 1 (314) 747-1288; E-mail: brauerd@wustl.edu

ISSN 0142-159X print/ISSN 1466-187X online/14/000001–11 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.970998

2013; 35: e1437–e1446 MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

The Objective Structured Clinical Examination (OSCE): AMEE Guide No. 81. Part I: An historical and theoretical perspective

KAMRAN Z. KHAN[1], SANKARANARAYANAN RAMACHANDRAN[2], KATHRYN GAUNT[2] & PIYUSH PUSHKAR[3]

[1]Manchester Medical School, UK, [2]Lancashire Teaching Hospitals NHS Trust, UK, [3]Aintree University Hospitals Trust, UK

Abstract

The Objective Structured Clinical Examination (OSCE) was first described by Harden in 1975 as an alternative to the existing methods of assessing clinical performance (Harden et al. 1975). The OSCE was designed to improve the validity and reliability of assessment of performance, which was previously assessed using the long case and short case examinations. Since then the use of the OSCE has become widespread within both undergraduate and postgraduate clinical education. We recognise that the introduction of the OSCE into an existing assessment programme is a challenging process requiring a considerable amount of theoretical and practical knowledge. The two parts of this Guide are designed to assist all those who intend implementing the OSCE into their assessment systems. Part I addresses the theoretical aspects of the OSCE, exploring its historical development, its place within the range of assessment tools and its core applications. Part II offers more practical information on the process of implementing an OSCE, including guidance on developing OSCE stations, choosing scoring rubrics, training examiners and standardised patients and managing quality assurance processes. Together we hope these two parts will act as a useful resource both for those choosing to implement the OSCE for the first time and also those wishing to quality assure their existing OSCE programme.

Introduction

Conducting an Objective Structured Clinical Examination (OSCE) for the first time is a complex and time-consuming task. It requires considerable understanding of the underlying educational principles of an OSCE and the development of academic and administrative structures to support and implement the examination. These supporting structures or entities could be in the form of teams and committees as described in detail in the second part of this Guide. In the institutions where the OSCE is already being used as an assessment tool, quality assurance and continuous improvement are important in order to maintain standards and psychometric rigour.

The current literature appears to be lacking a detailed and comprehensive manual to help institutions with the practicalities of implementing the OSCE for the first time, though a lot of studies covering various aspects of the OSCE have been published in peer reviewed journals. This Guide will present an evidence-based perspective on setting up an OSCE for those new to the approach, and will also provide some guidance and thought to those who would like to revisit their programmes for quality assurance purposes.

The Guide consists of two parts; Part I focuses on the historical background and educational principles of the OSCE. Knowledge and understanding of these principles is essential before moving any further in designing and administering an OSCE. We hope that the contents of Part I will act as a suitable and informative introduction for the readers, enabling them eventually to understand and implement the ideas and practical advice given in Part II, which will describe the organisation and administration of the OSCE.

Practice points

- Before the advent of OSCE, long case and short case examinations were used for the assessment of performance.
- The OSCE is an assessment tool based on the principles of objectivity and standardisation, which allows the assessment of candidates' performance against standardised scoring schemes by trained assessors.
- The OSCE assesses performance in a simulated environment, at the 'shows how' level of Miller's pyramid of assessment.
- The OSCE is most appropriately used, alongside other assessment methods, in a structured programme of assessment.
- A well-designed OSCE can drive learning, and therefore, can have a positive educational impact.

Correspondence: Dr Kamran Khan, Department of Anaesthetic, Mafraq Hospital, Mafraq, Abu Dhabi, UAE; email: Kamran.Khan950@gmail.com

ISSN 0142–159X print/ISSN 1466–187X online/13/091437–10 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.818634

2013; 35: e1511–e1530 MEDICAL TEACHER

WEB PAPER
AMEE GUIDE

Simulation in healthcare education: A best evidence practical guide. AMEE Guide No. 82

IVETTE MOTOLA[1], LUKE A. DEVINE[2], HYUN SOO CHUNG[3], JOHN E. SULLIVAN[1] & S. BARRY ISSENBERG[1]
[1]University of Miami Miller School of Medicine, USA, [2]Mount Sinai Hospital, Toronto, Canada, [3]Yonsei University College of Medicine, Seoul, Korea

Abstract

Over the past two decades, there has been an exponential and enthusiastic adoption of simulation in healthcare education internationally. Medicine has learned much from professions that have established programs in simulation for training, such as aviation, the military and space exploration. Increased demands on training hours, limited patient encounters, and a focus on patient safety have led to a new paradigm of education in healthcare that increasingly involves technology and innovative ways to provide a standardized curriculum. A robust body of literature is growing, seeking to answer the question of how best to use simulation in healthcare education. Building on the groundwork of the Best Evidence in Medical Education (BEME) Guide on the features of simulators that lead to effective learning, this current Guide provides practical guidance to aid educators in effectively using simulation for training. It is a selective review to describe best practices and illustrative case studies. This Guide is the second part of a two-part AMEE Guide on simulation in healthcare education. The first Guide focuses on building a simulation program, and discusses more operational topics such as types of simulators, simulation center structure and set-up, fidelity management, and scenario engineering, as well as faculty preparation. This Guide will focus on the educational principles that lead to effective learning, and include topics such as feedback and debriefing, deliberate practice, and curriculum integration – all central to simulation efficacy. The important subjects of mastery learning, range of difficulty, capturing clinical variation, and individualized learning are also examined. Finally, we discuss approaches to team training and suggest future directions. Each section follows a framework of background and definition, its importance to effective use of simulation, practical points with examples, and challenges generally encountered. Simulation-based healthcare education has great potential for use throughout the healthcare education continuum, from undergraduate to continuing education. It can also be used to train a variety of healthcare providers in different disciplines from novices to experts. This Guide aims to equip healthcare educators with the tools to use this learning modality to its full capability.

Introduction and background

A confluence of recent events has led to increased growth in the use of clinical simulation across the healthcare education continuum. These factors include an increased focus on patient safety, the call for a new training model not based solely on apprenticeship, a desire for standardized educational opportunities that are available on-demand, and a need to practice and hone skills in a controlled environment. In addition, the benefits of clinical simulation are increasingly reported in the literature, adding further validity to its use in healthcare education (Issenberg et al. 2005; McGaghie et al. 2010a). The effectiveness of simulation, like all educational modalities, depends on how well it is used. Simulation should be utilized as an adjunct to patient care experiences, and its integration into the curriculum should be well-planned and outcome driven.

Purpose/Guide overview

This Guide is meant to be a practical handbook for educators about the effective use of simulation for healthcare education. The goal is to discuss, in an evidence-based manner, the

Practice points

- Simulation is increasingly being used in healthcare education to teach cognitive, psychomotor, and affective skills to individuals and teams.
- It is important to first determine the outcomes of using simulation and utilize these to guide its integration into the curriculum.
- Feedback is critical to effective learning using simulation, and should be guided by individual learning needs.
- Simulation allows for training in a controlled environment, with opportunities for deliberate practice and assessment.
- Simulation-based mastery learning, or SBML, significantly improves skills for all participants, and also leads to skill retention.
- Further research is needed in the areas of instructional design, outcomes measurement, and translational and implementation sciences in the context of simulation.

Correspondence: Dr Ivette Motola, University of Miami Miller School of Medicine, Michael S. Gordon Center for Research in Medical Education, 1120 N.W. 14th Street, Miami, FL 33136, USA. Tel: 305-243-6491; fax: 305-243-6832; email: imotola@med.miami.edu

ISSN 0142–159X print/ISSN 1466–187X online/13/101511–20 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.818632

2013; 35: e1561–e1572

WEB PAPER
AMEE GUIDE

Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83

DAVID C. M. TAYLOR[1] & HOSSAM HAMDY[2]
[1]University of Liverpool, UK, [2]University of Sharjah, United Arab Emirates

Abstract

There are many theories that explain how adults learn and each has its own merits. This Guide explains and explores the more commonly used ones and how they can be used to enhance student and faculty learning. The Guide presents a model that combines many of the theories into a flow diagram which can be followed by anyone planning learning. The schema can be used at curriculum planning level, or at the level of individual learning. At each stage of the model, the Guide identifies the responsibilities of both learner and educator. The role of the institution is to ensure that the time and resources are available to allow effective learning to happen. The Guide is designed for those new to education, in the hope that it can unravel the difficulties in understanding and applying the common learning theories, whilst also creating opportunities for debate as to the best way they should be used.

Introduction

The more we read, the more we realise that there are many different ways of explaining how adults learn (Merriam et al. 2007). None of the individual theories fully explain what is happening when an aspiring health professional is engaged in learning. In this Guide, it will become clear that the authors hold a broadly constructivist view. Constructivists, like Vygotsky (1997), consider that learning is the process of constructing new knowledge on the foundations of what you already know. We will explain a constructivist schema, which we feel has an evidence base and forms a theoretical basis to help curriculum development, learning and teaching strategies, student assessment and programme evaluation.

Malcolm Knowles (1988) considered that adults learn in different ways from children. He introduced the term "andragogy" to differentiate adult learning from pedagogy; this differentiation now seems to be artificial. Many of the principles of andragogy can be applied equally to children's learning. It is probably more appropriate to think in terms of a learning continuum, which stretches throughout life, with different emphases, problems and strategies at different times.

In this Guide, we will indicate what we feel are the main types of learning theories, show briefly the way in which the theories have developed from each other, and then show how, and when, different theories can be applied to maximise learning.

When we consider medical education in particular it is important to remember that in some programmes the learners have already completed a university degree, and in others the students come straight from high or secondary school. Medical education also includes postgraduate studies and continuing professional development. Each of our students will have their own individual constraints, experiences and preferences. The educator's task is to provide an environment and the resources in which each learner can flourish.

Practice points

- Becoming a member of a healthcare profession not only demands the acquisition of knowledge and skills, but also involves a process of growing into the professional community.
- Although people learn in different ways, we all run through a process of working out what the possible explanations are and sorting them into probable and less probable, on the basis of reflecting on feedback, our existing experience and knowledge.
- Through understanding the ways in which people learn we can plan the most effective ways in which we can help them to learn.
- The model presented here gives a scheme and a checklist that we can use to increase our effectiveness in organising curricula, delivering education and assessing the outcomes.

Categories of adult learning theories

Our task is complicated by the observation that the theories of learning flow partly from psychological theories of learning

Correspondence: David C. M. Taylor, School of Medicine, University of Liverpool, Cedar House, Liverpool L69 3GE, UK. Tel: +44 151 794 8747; fax: +44 151 795 4369; email: dcmt@liv.ac.uk

ISSN 0142–159X print/ISSN 1466–187X online/13/111561–12 © 2013 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.828153

2014; 36: 1–12 MEDICAL TEACHER

AMEE GUIDE

Problem-based learning (PBL): Getting the most out of your students – Their roles and responsibilities: AMEE Guide No. 84

EMILY BATE[1], JULIETTE HOMMES[2], ROBBERT DUVIVIER[2] & DAVID C. M. TAYLOR[1]
[1]The University of Liverpool, UK, [2]Maastricht University, The Netherlands

Abstract

This Guide discusses the considerable literature on the merits or shortcomings of Problem-based learning (PBL), and the factors that promote or inhibit it, when seen through the eyes of the student. It seems to be the case that PBL works best when students and faculty understand the various factors that influence learning and are aware of their roles; this Guide deals with each of the main issues in turn. One of the most important concepts to recognise is that students and Faculty share the responsibility for learning and there are several factors that can influence its success. They include student motivation for PBL and the various ways in which they respond to being immersed in the process. As faculty, we also need to consider the way in which the learning environment supports the students develop the habit of life-long learning, and the skills and attitudes that will help them become competent reflective practitioners. Each of these elements place responsibilities upon the student, but also upon the Faculty and learning community they are joining. Although all of the authors work in a European setting, where PBL is used extensively as a learning strategy in many medical schools, the lessons learned we suggest, apply more widely, and several of the important factors apply to any form of curriculum. This Guide follows on from a previous review in the AMEE Guides in Medical education series, which provided an overview of PBL and attempts to emphasise the key role that students have in mastering their subject through PBL. This should render the business of being a student a little less mystifying, and help faculty to see how they can help their students acquire the independence and mastery that they will need.

Introduction

Problem-based learning (PBL) is an approach to learning that is used to a greater or lesser degree in many medical schools worldwide. PBL is intended to enable students to work together in groups to learn about a subject in the context of a real problem.

Much research has been conducted into the rationale for the use of PBL within the medical student curriculum (Taylor & Miflin 2008). This Guide takes a different view: the perspective of the student. PBL encapsulates the beliefs that learning results from cognitive and social interactions in problem-centred environments (Greeno et al. 1996; Evensen & Hmelo 2000; Savery & Duffy 2001). Students are active partners in their learning, and not passive recipients. The involvement of students in PBL is paramount to achieving the objective of learning. It is their involvement in the process that will help them to learn from each other's experiences, sift, sort and refine ideas, consolidate what they know, and rehearse the arguments that will serve them well in the clinical environment and in passing the inevitable examinations (Taylor & Hamdy 2013).

The aim of this Guide is to describe student involvement within a PBL programme. This will be approached by briefly considering what PBL is (or should be), and then focussing on various aspects of student involvement: how the student feels during the process and how that can affect learning. We will also consider the way that PBL can help students develop as life-long learners, the way it can help them to cross into the clinical community of practice, and what the student needs to do to gain increased benefit from PBL. Finally, we will discuss what faculty needs to know, and do, concerning student involvement in PBL. By understanding the subtleties of student involvement in PBL, we hope to show how student learning can be improved and faculty time best utilised.

Practice points

- PBL is a learning process that requires students to be actively involved in collaborative group work
- PBL is an active and immersive process in which the students must take significant responsibility for their learning
- PBL helps students develop into competent reflective practitioners
- Learning has motivational and emotional components, and PBL groups can foster (or hinder) these depending on the skills of the facilitator
- The key to a successful outcome (achieving educational objectives) is for students and faculty to understand the process of learning and their role in it

Correspondence: The Reverend Dr. David C. M. Taylor, School of Medicine, The University of Liverpool, Liverpool L69 3GE, UK. Tel: + 44(0) 151 794 8747; fax: + 44(0) 151 795 4369; email: dcmt@liv.ac.uk

ISSN 0142-159X print/ISSN 1466-187X online/14/10001-12 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.848269

2014; 36: 97–110 MEDICAL TEACHER

AMEE GUIDE

How to set standards on performance-based examinations: AMEE Guide No. 85

DANETTE W. MCKINLEY & JOHN J. NORCINI
FAIMER, Research and Data Resources, USA

Abstract

This AMEE Guide offers an overview of methods used in determining passing scores for performance-based assessments. A consideration of various assessment purposes will provide context for discussion of standard setting methods, followed by a description of different types of standards that are typically set in health professions education. A step-by-step guide to the standard setting process will be presented. The Guide includes detailed explanations and examples of standard setting methods, and each section presents examples of research done using the method with performance-based assessments in health professions education. It is intended for use by those who are responsible for determining passing scores on tests and need a resource explaining methods for setting passing scores. The Guide contains a discussion of reasons for assessment, defines standards, and presents standard setting methods that have been researched with performance-based tests. The first section of the Guide addresses types of standards that are set. The next section provides guidance on preparing for a standard setting study. The following sections include conducting the meeting, selecting a method, implementing the passing score, and maintaining the standard. The Guide will support efforts to determine passing scores that are based on research, matched to the assessment purpose, and reproducible.

Introduction

Standard setting is the process of defining or judging the level of knowledge and skill required to meet a typical level of performance and then identifying a score on the examination score scale that corresponds to that performance standard. Standard setting procedures are employed to provide a conceptual definition of competence for an occupation or educational domain and to operationalise the concept. When considering the conceptual definition of competence, it is helpful to think about the criteria developed in competency-based medical education. The descriptive information provided in the development of milestones or benchmarks (Holmboe et al. 2010) can be helpful in defining the performance standard. The standard setting process is designed to translate a conceptual definition of competence to an operational version, called the passing score (Kane 1994; Norcini 1994). Verification that the passing score is appropriate is another critical element in collecting evidence to support the validity of test score interpretation (American Educational Research Association et al. 1999; Kane 2006). Various approaches to determining passing scores for examinations have been developed and researched. In this Guide, an overview to the methods that have been typically used with performance-based assessments will be provided. A consideration of various assessment purposes will provide context for discussion of standard setting methods, followed by a description of different types of standards that are typically set in health professions education. A step-by-step guide to the standard setting process will be presented.

Practice points

- Although there is extensive research on standard setting with both multiple-choice and performance-based tests, there is no "right" passing score, and no "best" method
- Different methods yield different results
- Pre-fixed passing scores set without consideration of test content or examinee performance can vary greatly due to test difficulty and content, affecting the appropriateness of the decisions made
- Selecting a method depends on the purpose of the examination and the resources available for the standard setting effort
- The passing score should be determined by a group (e.g. faculty members) familiar with the assessment purpose and the domain assessed
- The standard setting method selected should: be closely aligned with assessment goals; be easy to explain and implement; require judgments that are based on performance data; entail thoughtful effort; and be based on research

Assessment purposes

In education, it is often necessary to evaluate whether trainees are attaining the knowledge, skills, and attitudes needed to perform in the field of endeavour. In order to determine whether "sufficient knowledge, skills and attitudes" are

Correspondence: Danette W. McKinley, PhD, Foundation for the Advancement of International Medical Education and Research, 3624 Market Street, 4th Floor, Philadelphia, PA 19104, USA. Tel: 1 215 823 2231; fax: 1 215 386 3309; email: dmckinley@faimer.org

ISSN 0142–159X print/ISSN 1466–187X online/14/020097–14 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2013.853119

2014, 36: 371–384 MEDICAL TEACHER

AMEE GUIDE

Cognitive Load Theory: Implications for medical education: AMEE Guide No. 86

JOHN Q. YOUNG[1], JEROEN VAN MERRIENBOER[2], STEVE DURNING[3] & OLLE TEN CATE[4]

[1]Hofstra North Shore-LIJ School of Medicine, USA, [2]Maastricht University, The Netherlands, [3]Uniformed Services University of the Health Sciences, USA, and [4]Center for Research and Development of Education, The Netherlands

Abstract

Cognitive Load Theory (CLT) builds upon established models of human memory that include the subsystems of sensory, working and long-term memory. Working memory (WM) can only process a limited number of information elements at any given time. This constraint creates a "bottleneck" for learning. CLT identifies three types of cognitive load that impact WM: intrinsic load (associated with performing essential aspects of the task), extraneous load (associated with non-essential aspects of the task) and germane load (associated with the deliberate use of cognitive strategies that facilitate learning). When the cognitive load associated with a task exceeds the learner's WM capacity, performance and learning is impaired. To facilitate learning, CLT researchers have developed instructional techniques that decrease extraneous load (e.g. worked examples), titrate intrinsic load to the developmental stage of the learner (e.g. simplify task without decontextualizing) and ensure that unused WM capacity is dedicated to germane load, i.e. cognitive learning strategies. A number of instructional techniques have been empirically tested. As learners' progress, curricula must also attend to the expertise-reversal effect. Instructional techniques that facilitate learning among early learners may not help and may even interfere with learning among more advanced learners. CLT has particular relevance to medical education because many of the professional activities to be learned require the simultaneous integration of multiple and varied sets of knowledge, skills and behaviors at a specific time and place. These activities possess high "element interactivity" and therefore impose a cognitive load that may surpass the WM capacity of the learner. Applications to various medical education settings (classroom, workplace and self-directed learning) are explored.

Introduction

Successful learning requires the interplay of multiple processes, including those in the cognitive, affective (i.e. motivation and emotion), social (i.e. interaction with and experience of others), environmental (i.e. location or setting) and metacognitive (i.e. thinking about one's thinking) domains. Given the complexity of learning, it is not surprising that many, sometimes competing and often overlapping theories of learning have been put forward. Schunk (2012) recently categorized learning theories into neuroscience, behaviorism, social cognition, information processing, constructivism, cognitive learning, motivation, self-regulation and development (Schunk 2012). With the plethora of theories arising from disparate academic disciplines, the vocabulary can be obtuse and the arguments intense.

The debates around learning theories can be reminiscent of the story of the elephant and the six blind men (Mallisena et al. 1933). The six blind men were asked to determine what an elephant looked like by feeling different parts of the elephant's body. They of course came to very different conclusions. The blind man who feels a leg says the elephant is like a pillar; the one who feels the tail says the elephant is like a rope; the one who feels the trunk says the elephant is like a tree branch; the one who feels the ear says the elephant is like a hand-held fan; the one who feels the belly says the elephant is like a wall; and the one who feels the tusk says the elephant is like a solid pipe. Resolution to the conflict only occurs when an "enlightened one" points out that each is describing one part of the whole. Similarly, in medical education, we have multiple theories. Each captures a "part of the whole". However, no "enlightened one" or unifying theory of learning has (yet) emerged. Therefore, educators must select from amongst these theories and then adapt and apply them as appropriate.

Cognitive Load Theory (CLT), first described by John Sweller in 1988 (Sweller 1988), represents an important cognitive learning theory, which is receiving increasing recognition in medical education. CLT integrates three key components of the cognitive architecture: memory systems (sensory, working and long-term memory; LTM), learning processes and types of cognitive load imposed on working memory (WM). CLT has particular relevance to medical education because the tasks and professional activities to be learned require the simultaneous integration of multiple and varied sets of knowledge, skills and behaviors at a specific time and place. These tasks may overload the learner. CLT helps us understand how and why learners in the health professions struggle with mastering the complex concepts and developing toward expertise. CLT has also generated new instructional approaches that hold promise (van Merriënboer & Kirschner 2013). This guide will help medical educators understand CLT and how it can be used to optimize learning. We will

Correspondence: John Q. Young, MD, MPP, Vice Chair, Department of Psychiatry, Zucker Hillside Hospital, Hofstra North Shore-LIJ School of Medicine, 75-59 263rd, Glen Oaks, NY 11004, USA. Tel: 718-470-4891; Fax: 718-962-7717; E-mail: Jyoung9@nshs.edu

ISSN 0142-159X print/ISSN 1466-187X online/14/50371–384 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.889290

2014, 36: 463–474

AMEE GUIDE

Developing questionnaires for educational research: AMEE Guide No. 87

ANTHONY R. ARTINO, JR.[1], JEFFREY S. LA ROCHELLE[1], KENT J. DEZEE[1] & HUNTER GEHLBACH[2]
[1]Uniformed Services University of the Health Sciences, USA, [2]Harvard Graduate School of Education, USA

Abstract

In this AMEE Guide, we consider the design and development of self-administered surveys, commonly called questionnaires. Questionnaires are widely employed in medical education research. Unfortunately, the processes used to develop such questionnaires vary in quality and lack consistent, rigorous standards. Consequently, the quality of the questionnaires used in medical education research is highly variable. To address this problem, this AMEE Guide presents a systematic, seven-step process for designing high-quality questionnaires, with particular emphasis on developing survey scales. These seven steps do not address all aspects of survey design, nor do they represent the only way to develop a high-quality questionnaire. Instead, these steps synthesize multiple survey design techniques and organize them into a cohesive process for questionnaire developers of all levels. Addressing each of these steps systematically will improve the probabilities that survey designers will accurately measure what they intend to measure.

Introduction: Questionnaires in medical education research

Surveys are used throughout medical education. Examples include the ubiquitous student evaluation of medical school courses and clerkships, as well as patient satisfaction and student self-assessment surveys. In addition, survey instruments are widely employed in medical education research. In our recent review of original research articles published in *Medical Teacher* in 2011 and 2012, we found that 37 articles (24%) included surveys as part of the study design. Similarly, surveys are commonly used in graduate medical education research. Across the same two-year period (2011–2012), 75% of the research articles published in the *Journal of Graduate Medical Education* used surveys.

Despite the widespread use of surveys in medical education, the medical education literature provides limited guidance on the best way to design a survey (Gehlbach et al. 2010). Consequently, many surveys fail to use rigorous methodologies or "best practices" in survey design. As a result, the reliability of the scores that emerge from surveys is often inadequate, as is the validity of the scores' intended interpretation and use. Stated another way, when surveys are poorly designed, they may fail to capture the essence of what the survey developer is attempting to measure due to different types of measurement error. For example, poor question wording, confusing question layout and inadequate response options can all affect the reliability and validity of the data from surveys, making it extremely difficult to draw useful conclusions (Sullivan 2011). With these problems as a backdrop, our purpose in this AMEE Guide is to describe a systematic process for developing and collecting reliability and validity evidence

Practice points

- Questionnaires are widely used in medical education research, yet the processes employed to develop questionnaires vary in quality and lack consistent, rigorous standards.
- This AMEE Guide introduces a systematic, seven-step design process for creating high-quality survey scales fit for program evaluation and research purposes.
- The seven-step design process synthesizes multiple techniques survey designers employ into a cohesive process.
- The survey design process described in this Guide includes the following seven steps: (1) conduct a literature review, (2) carry out interviews and/or focus groups, (3) synthesize the literature review and interviews/focus groups, (4) develop items, (5) collect feedback on the items through an expert validation, (6) employ cognitive interviews to ensure that respondents understand the items as intended and (7) conduct pilot testing.
- This seven-step design process differs from previously described processes in that it blends input from other experts in the field as well as potential participants. In addition, this process front loads the task of establishing validity by focusing heavily on careful item development.

Correspondence: Anthony R. Artino, Jr., PhD, Associate Professor of Preventive Medicine and Biometrics, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814-4712, USA. Tel: +1-301.295.3693; E-mail: anthony.artino@usuhs.edu

ISSN 0142-159X print/ISSN 1466-187X online/14/060463–474 © 2014 Informa UK Ltd.
DOI: 10.3109/0142159X.2014.889814