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From Miller's pyramid to EPAs: an educational primer on assessment for clinical teachers (Guide II)

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Abstract

Assessment is one of the fundamental pillars of medical education, but the terminology involved is a source of confusion to many clinical educators. Concepts such as assessment vs. evaluation, formative vs. summative, competence vs. competency, and skill vs. micro-skill are all commonly confused, resulting in suboptimally designed assessment tools and erroneous conclusions drawn from these tools. This educational primer focuses on basic assessment concepts for clinical teachers and is not intended to provide a comprehensive overview of all available assessment tools. Rather, it provides a conceptual overview of essential assessment concepts for clinical educators. It starts by defining important differentiations, such as that between assessment (learner-centered) and evaluation (program-focused). Miller's pyramid and Van der Vleuten's utility equation are introduced as theoretical models in the selection of appropriate assessment tools. Tools are categorized according to each level in the pyramid, such as using written examinations for knowledge assessments, and Mini-Clinical Evaluation Exercise (Mini-CEX), Direct Observation of Procedural Skills (DOPS), and others for workplace-based clinical performance assessments. The primer then clarifies confusing concepts related to competence, such as distinguishing between skill (one aspect of a person's repertoire of abilities) and competency (the comprehensive combination of several skills). Lastly, this article explains Entrustable Professional Activities (EPAs) and the concept of decision making regarding entrustment, which connect competence concepts with the activities in the field of clinical medicine. This conceptual model allows educators in the medical field to create a unified approach to assessing students and thus create competent physicians.

Keywords: assessment; evaluation; competency; competence; skill; micro-skill; entrustable professional activities; EPA; education; medical

Introduction

Following the examination of concepts in the teaching-learning domain in a previously published article [1], this article discusses assessment as another important domain of medical education. Assessment is one of the fundamental elements of an educational system. It ensures educational quality, facilitates learning, and certifies the achievements of the learners [1, 2]. Along with the transition from time-based training in medicine to Competency-Based Medical Education (CBME), the task of conducting assessments has become more complicated [3, 4]. Assessment terminology has always been a frequent cause of misunderstanding for clinicians, educators, and other stakeholders unfamiliar with this aspect of education [1]. A central challenge is the dispersion of concepts and the inconsistent interpretations that clinical teachers make of key assessment terms, which directly undermines the validity of evaluation processes. Well-known scholars, such as Van der Vleuten, Norcini, ten Cate, Schuwirth, and Harden, have provided a wide array of useful yet diverse views on this topic. These diverse views, while valuable, have led to multiple overlapping definitions and competing frameworks -- for example, different ways of defining "competence" versus "competency" or different

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taxonomies for workplace-based assessment -- creating ambiguity for clinical teachers who must choose among them without a unified conceptual structure. While such diversity reflects an evolving discipline, the absence of a coherent conceptual framework impedes the classification of fundamental concepts for clinical educators. For instance, failure to properly differentiate assessment from evaluation, or misunderstanding the relationship between competency, skill, and EPAs will inevitably lead to a flawed evaluation process and wrong conclusions on learners' progression [3]. Therefore, the aim of this primer on education is to provide a guide through various aspects related to the topic of assessment. Relying on well-grounded theoretical knowledge and understanding, this paper gives definitions of some key terms, explains their interrelation, and lays the groundwork for future use of common language among clinical teachers.

Foundational concepts in assessment

Before a clinical teacher can correctly choose an assessment method or interpret a learner's performance, they must first understand a handful of basic concepts that are often confused. Familiarity with these concepts provides a necessary foundation for discussing more complicated issues, like competency-based assessments and entrustable professional activities. The diversity and similarity of terminology can lead to confusion; therefore, it is critical to distinguish basic terms first [5].

Assessment

Assessment is the systematic process of collecting, analyzing, and interpreting evidence of learner performance to inform decisions that enhance learning and development [2,4]. For the clinical teacher in practice, this means: assessment involves gathering information (through observation, tests, or work samples), interpreting that information against learning objectives, and then using the interpretation either to provide constructive feedback (formative assessment) or render a summative judgment about the learner's achievement (summative assessment). Unlike a simple measurement (e.g., assigning a score), assessment requires interpretation of that evidence to guide next steps in teaching and learning.

Assessment vs. evaluation

Despite the interchangeable use of these terms by some clinical teachers, they have very different meanings and functions [6–8]. Whereas assessment looks at the individual learner, evaluation takes into consideration the educational program, course, or system. The question that assessment tries to answer is, "Has this learner met the learning objectives?" while that which evaluation seeks to answer is, "Has the program achieved its intended goals?" [3, 6, 9]. For example, assessment is used when judging a resident's performance in a Mini-CEX, whereas evaluation is applied when determining the effectiveness of a longitudinal training course in communication skills.

Foundational concepts: Objective and measurement

Before one can assess whether a learner is competent, it is necessary to clarify two foundational concepts: what is expected of the learner to achieve (objective) and how evidence of that achievement is captured (measurement). Without clear objectives and accurate measurement, any judgment of competence remains vague and unreliable. An objective is a measurable result which learners should acquire at the end of the educational process [10]. Objectives are stated according to the SMART criteria (Specific, Measurable, Achievable, Relevant, and Time-bound) and define what must be measured. To measure means to assign numerals to phenomena following certain rules [11]. For example, awarding 16 out of 20 points on an OSCE station constitutes an act of measurement. Measurement refers solely to collecting data and quantifying performance.

Assessment, by contrast, is a broader process that includes measurement, interpretation of the measured data, and making informed decisions to support or improve learning [5]. Importantly, this use of the term "interpretation" in assessment is different from "evaluation," which in this article refers to judging the effectiveness of an educational program or system (as distinguished earlier).

From skill to competency and competence: defining the building blocks

Several terms related to skill, competency, and competence may be confusing for clinical teachers. Using the classification proposed by ten Cate, Frank, Van der Vleuten, Norcini, Shah, and others, these terms can be distinguished hierarchically [5,10–14].

Skill and micro-skill

Skill is the capacity to perform an action correctly, appropriately, and in a timely manner [10,14]. It is an underlying ability that becomes observable through

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performance and can therefore be assessed indirectly. Performance, in contrast, is the actual demonstration of that skill in a real or simulated setting -- what the observer sees the learner do at a specific moment. For example, venous cannulation performed successfully on a patient is a performance that reflects the underlying skill of cannulation; identification of heart sounds on a real patient is a cognitive-perceptual performance. A learner may possess the underlying skill yet demonstrate variable performance across clinical encounters because of contextual or personal factors.

This distinction explains why competence should be inferred from multiple observations rather than a single performance. A micro-skill is a further subdivision of the major skill. For instance, the skill of suturing includes microskills such as needle holder grasp, suturing through the edges of the wound, and tying knots [13]. Recognition of micro-skills plays an important role in checklist design and providing focused feedback. It becomes particularly useful when a trainee fails; deconstruction of the skill into several micro-skills enables identification of the source of trouble.

Learning domains

Competence can be viewed from various angles [2,14]. The cognitive domain refers to intellectual skills and knowledge, ranging from memory to clinical reasoning. The affective domain is connected to attitudes, values, and emotions, which include empathy and professionalism.

Finally, the psychomotor domain encompasses physical skills and neuromotor coordination and consists of procedural skills and physical examination skills. Full-fledged competence in medicine requires development and integration in all three domains. For instance, a doctor can be knowledgeable (cognitive) and have poor motor skills (psychomotor), or vice versa -- the practitioner may possess strong technical skills and be indifferent (affective).

Competency, competence, and competencies

Although these terms are frequently used interchangeably, their meanings are different. According to Frank and colleagues, competency is an integrated ability that enables health professionals to perform practice tasks and professional roles through the synthesis of knowledge, skills, attitudes, and values [11]. Shah et al. stress that competency surpasses its constituent skills and requires professional wisdom and flexibility [9]. It is essential to distinguish between skill and competency. While skill means a particular ability (e.g., taking a history), competency involves complex abilities which are composed of several skills [12,14]. Communicating with a critically ill patient in the Emergency Department is a competency -- a complex, integrated activity that goes beyond any single skill. It requires knowledge about the illness signs, communication skills, ethics awareness (keeping privacy), and good judgment on how and what to tell. This example shows that a competency is always integrated and context-dependent; it cannot be reduced to a checklist of isolated actions. Competence is the comprehensive ability of an individual to perform their professional role [7]. The term refers to a higher level of professional ability rather than an isolated competency. When it is stated that "this doctor has all the competencies required for the job," this refers to the overall effectiveness as an independent practitioner. Competencies (plural) are the measurable, observable components that constitute that overall competence [14,15].

Effective communication with patients is one competency; clinical reasoning is another; procedural proficiency is a third. For a concise side-by-side comparison of these three terms with definitions and practical examples, see **Table 1.**

Milestones and judgments of competence

Milestones can be considered developmental landmarks on the road from a novice practitioner to a competent professional. They refer to the level of development attained at each stage of training. For example, for the skill of central venous catheter insertion, milestones could be defined as: 1) performs under direct supervision, 2) performs with indirect supervision, 3) performs independently, and 4) supervises and teaches others. Milestones create a map that will help evaluate one's progress. Milestones create a map that will help evaluate one’s progress. A competent individual is one whom evaluators judge to have met the required standards for specific competency or competence [14].

Domains of competence

Various competency frameworks classify competencies in larger categories. The CanMEDS framework by the Royal College of Physicians and Surgeons of Canada has seven different roles, such as Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, and Professional [15]. The ACGME framework contains six basic domains -- namely, Patient Care,

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Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice [12]. These frameworks illustrate that being a competent medical practitioner presupposes much more than simply knowing clinical medicine and techniques of treating diseases. To maintain consistency and avoid confusion, this article uses the following conventions unless directly quoting a source: 'competence' denotes global professional ability, 'competency' (plural 'competencies') refers to observable components, and 'competences' is reserved for domain-level categories within frameworks such as CanMEDS. This distinction is applied uniformly in the text, tables, and boxes.

Table 1. Application of key assessment concepts in clinical settings

Key concept	Practical application in medical education	Concrete example
Objective	Designing specific, measurable behavioral objectives for each educational station or session	"By the end of the session, the student must be able to identify atrial fibrillation rhythm on a 12-lead ECG and describe the initial management steps"
Measurement	Using checklists and rating scales to quantify observable performance	Assigning scores of 0 (not performed), 1 (needs improvement), and 2 (performed correctly) for each step of a procedure in an OSCE station
Skill	Teaching and assessing discrete, observable skills in skills laboratory stations	Assessing the skill of "venous cannulation" or "wound dressing" in a dedicated OSCE station
Micro-skill	Breaking complex skills into smaller components for checklist design and precise feedback	In DOPS, breaking the procedure "urinary catheterization" into 12 discrete steps from hand washing to catheter fixation
Cognitive Domain	Designing written and oral questions to assess knowledge and clinical reasoning	Multiple-choice questions based on clinical scenarios that assess diagnostic and decision-making abilities
Affective Domain	Using multi-source feedback tools to assess attitudes and professional behaviors	Collecting patient feedback about the physician's communication style and expression of empathy
Psychomotor Domain	Direct observation of performance in simulated environments using checklists	Evaluating the accuracy and fluidity of laryngoscopy performance on a simulator mannequin by the supervisor
Competency	Designing curriculum and assessment based on expected final competencies	Using the seven CanMEDS roles to define competencies for medical graduates
Competence	Final judgment about an individual's overall ability to fulfill a professional role	"This resident has acquired the necessary overall competence for independent practice" based on aggregate assessments
Competencies	Assessing the constituent components of overall competence separately	Evaluating the competency "effective communication with patients" alongside the competency "clinical diagnosis"
Competences	The major domains of competence in which a professional must be proficient	The seven CanMEDS roles (Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, Professional) defined as seven core Competences in medicine
Entrustable Professional Activity (EPA)	Defining specific work units that can be entrusted to learners	"Initial management of a patient with chest pain in the emergency department" or "obtaining informed consent for surgery" defined as EPAs
Entrustment Decision	Clinical supervisor's judgment about the learner's level of independence in performing an EPA	Based on 8 successful observations, the supervisor decides to entrust the resident to perform the EPA "catheterization" independently
Milestone	Defining developmental waypoints to monitor learners' progressive advancement over time	Procedural milestones: 1) performs with direct supervision, 2) performs with indirect supervision, 3) performs independently, 4) teaches others

Note: In this Table, "competence" (uncountable) refers to the overall ability of an individual to fulfill a professional role. "Competency" (countable, plural "competencies") refers to an observable, measurable component of competence (e.g., effective communication). Some frameworks (e.g., CanMEDS) use the plural "competences" to denote major domains of professional activity (e.g., Medical Expert, Communicator). Where these terms appear in the table, the original usage of each cited framework has been followed to preserve accuracy.

Box1. Integrated application: A clinical scenario

Dr. A assesses a resident's ability to perform the EPA "initial management of a patient with chest pain."

- **Objective** (SMART): By the end of the month, the resident independently evaluates chest pain, formulates a differential, and orders initial tests.
- **Assessment** (workplace-based): Dr. A uses Mini-CEX for direct observation of the clinical encounter, with a checklist that includes micro-skills (history, physical exam, ECG interpretation).
- **Competencies deployed**: Medical Expert (cognitive), Communicator (affective), Procedural skill (psychomotor).
- **Competence judgment**: After repeated observations and portfolio documentation, Dr. A judges that the resident has achieved the required level across all competencies.
- **Entrustment decision**: Dr. A entrusts the resident to perform the EPA independently – i.e., the resident is now considered competent for this professional activity.

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From competencies to action – the EPA approach

Having established an understanding of competence and its components, this article now introduces a concept that transforms these theoretical constructs into language that is directly meaningful for clinical practice.

What is an Entrustable Professional Activity (EPA)?

The term "EPAs" was coined by Olle ten Cate to bridge the gap between competencies and clinical practice [3,16]. An EPA is an observable and entrustable professional activity within a specific medical specialty that can be entrusted to a learner for independent performance after the learner's competence has been adequately demonstrated [17]. Examples of EPAs include "Initial assessment of a patient with chest pain," "Obtaining consent from a patient for surgery," and "Family discussion regarding end-of-life care."

How EPAs relate to competencies

Every EPA requires the combination of various competencies across different domains [3]. The EPA, "initial management of a patient with chest pain," requires competencies in medical knowledge (differential diagnosis), communication skills (consent acquisition), teamwork (referral to a cardiologist), and professional behavior. Therefore, an EPA is the work unit in which all competencies come together in a practical situation. Competencies outline the objectives, while EPAs translate these objectives into specific clinical activities. This relationship creates a link between academic aspirations and actual practice, guiding the evaluation process on how, when, and where assessment needs to take place.

Entrustment decision-making

Entrustment decision-making is central to assessment under the EPA framework. It involves the decision by a clinical educator, after observing a trainee's performances in various EPAs, that the trainee can be entrusted to perform that EPA autonomously [7,20]. Such a decision requires information obtained from several sources of assessment.

Entrustment should not be conceptualised as a binary (yes/no) decision but is instead a continuum of increasing degrees of trust [16,17]. Trainees may first be entrusted with carrying out an EPA under indirect supervision before being deemed capable of doing so autonomously.

The application of these critical concepts is presented in **Table 1**.

Distinction between Competences and Competencies

To avoid confusion between macro-level domains and micro-level components, some frameworks (e.g., CanMEDS) refer to major domains of professional activity as "competences" (e.g., Medical Expert, Communicator). Within each such domain, specific observable abilities are called "competencies" (e.g., "taking a focused history" as part of the Medical Expert competence). In curriculum design, one first defines the competences (the 'what' of professional roles), then for each competence specifies the competencies (the 'how' of assessment). For example, the CanMEDS competence "Communicator" includes competencies such as "establishes rapport with patients" and "uses plain language to explain diagnoses."

Matching assessment tools to competence levels

Once clinical teachers understand the basic concepts of assessment, the next practical question becomes which assessment tool is appropriate for each educational purpose. Two well-established frameworks help to address this question.

Miller's pyramid indicates the level of competence being measured, while Van der Vleuten's utility equation evaluates the effectiveness of the measurement method employed.

Miller's pyramid: matching assessment tools to levels of competence

Originally proposed by George Miller in 1990, this pyramid remains one of the most widely used models for understanding clinical competence [2,18]. This model comprises four levels that are arranged hierarchically from base to apex. At the base of the pyramid is the Knows level, representing factual knowledge, which is commonly assessed through written examinations such as multiple-choice questions (MCQ).

The second level is Knows how, where knowledge is applied and is usually evaluated via essays or problem-based tasks. The third step is Shows how -- performance in a simulated setting evaluated through tools such as objective structured clinical examinations (OSCEs) or simulators. At the apex is the Does level -- actual performance in the clinical workplace, evaluated through

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workplace-based assessment tools such as Mini-CEX and DOPS [18].

Miller's pyramid reminds teachers that competence is not a single-level concept. A learner may know the facts (Knows) and even know how to apply them (Knows how), but the ultimate goal of medical training is to ensure they actually do (Does) demonstrate competent performance in real clinical settings. The level of assessment must match the level of competence being assessed. Van der Vleuten^' s utility equation:

$$\boldsymbol{U = V_w \times R_w \times F_w \times A_w \times E_w}$$

While Miller's pyramid helps determine what level of competence should be assessed, educators must also consider how effective a particular assessment method is. Van der Vleuten et al. have offered one such model that was designed to assess different methods of assessment in medicine and called it "the utility equation" [2,6]. According to this framework, the utility of any assessment technique depends on five interacting components: validity (the extent to which a method tests the desired abilities), reliability (consistency and reproducibility), feasibility (the ease and time required to conduct the procedure), acceptability (whether the method is accepted by relevant stakeholders, including faculty and learners), and educational impact (the degree to which the assessment promotes desirable learning and practice behaviours). These components function multiplicatively - meaning that if any single factor is entirely absent (e.g., zero reliability or zero validity), the overall utility drops to zero. In practice, no single method is ideal; rather, the aim is to achieve an optimal balance among these features within a comprehensive program of assessment.

Putting theory into practice

Based on the frameworks above, common assessment tools in medical education fall into four main categories corresponding to the levels of Miller's pyramid: written assessments, simulation-based assessments, workplace-based assessments, and oral assessments [7,20].(**Table 2**)

Written assessments target the Knows and Knows how levels. These include multiple-choice questions, short answer questions, and essays. They are effective for measuring knowledge but cannot capture the complexity of real clinical practice.

A learner who writes a perfect answer about managing chest pain may still experience difficulty performing when facing an actual patient.Oral assessments target the Knows, Knows how, and sometimes Shows how levels. These include structured viva examinations, oral case presentations, and panel oral exams. They are particularly useful for assessing clinical reasoning, integrated knowledge, and the ability to justify decisions under questioning. However, oral assessments may suffer from lower reliability if not carefully structured, and they typically do not capture actual clinical performance at the Does level.

Simulation-based assessments target the Shows how level. These include OSCEs with standardized patients, high-fidelity mannequins, and task trainers. Simulation offers two major advantages: standardization (all learners face the same situation) and patient safety (learners can make mistakes without harming real people). However, performance in a simulated environment may not perfectly predict performance in actual clinical settings.

The fidelity of the simulation and the authenticity of the scenario can affect results.Workplace-based assessments (WPBA) focus on the Does level, which is the highest level of Miller's pyramid. These are the cornerstone of competency-based medical education. The four most commonly used tools are: Mini-CEX (Mini-Clinical Evaluation Exercise), which entails direct observation of an entire patient interaction with subsequent feedback; DOPS (Direct Observation of Procedural Skills), where the focus is on procedural skills involving a structured checklist; CBD (Case-Based Discussion), a discussion of clinical cases documented by trainees in order to evaluate their clinical reasoning skills; MSF (Multi-Source Feedback)/360-degree feedback, a collection of data from colleagues, superiors, nurses, and even patients, providing a comprehensive evaluation of a trainee's abilities, particularly in domains such as communication skills and professionalism. WPBA are specifically designed to evaluate whether the learner is competent to practice independently [20].

An integrated framework for programmatic assessment

With the fundamental concepts and assessment tools now clarified, the broader question is how these elements can be integrated into a coherent assessment system. Every assessment system, whether explicitly or implicitly, rests on underlying assumptions about the nature of competence. Understanding these frameworks is vital for designing effective assessment programs. In AMEE Guide No. 78, Van der Vleuten and Schuwirth

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introduce three major types of assessment frameworks: analytic, synthetic, and developmental [5]. In addition, outcome-oriented frameworks define the direction of the entire educational system.

Defining the destination: outcome-oriented frameworks

Before creating any assessment strategy, the intended goal must be clearly defined. An outcome approach responds to the question of "What attributes must the ideal graduate have?" This framework, often referred to as an outcome or competency-based educational model, serves as the foundation from which curricula and assessment strategies develop [10,11]. According to the CanMEDS model, there are seven important roles: Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, and Professional. In the ACGME model, there are six important domains: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice [12]. They represent the "final destination" of the educational program. However, they may lead to a narrow focus if regarded by faculty as mere checklists.

Table 2. Classification of assessment tools in medical education

Workplace-Based Assessment (WPBA)	Simulation-Based Assessment	Oral Assessment	Written Assessment
1.Direct Observation Tools: • DOPS (Direct Observation of Procedural Skills) • Mini-CEX (Mini-Clinical Evaluation Exercise) • O-SCORE (Ottawa Surgical Competency OR Scale) **2.Case-Based Discussion Tools:** • CBD (Case-Based Discussion) • Chart-Stimulated Recall (CSR) • Chart Simulation **3.Performance Data Analysis:** • Logbook Analysis • Portfolio Assessment • Learning Analytics **4.Multi-Source Feedback:** • 360-Degree Feedback • MSF (Multi-Source Feedback) • Peer Assessment • Patient Feedback/GRF (Global Rating Form)	**1.Simulation Environments:** • High-Fidelity Simulation (mannequins) • Medium-Fidelity Simulation • Low-Fidelity Task Trainers • Standardized Patients (SP) • Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), Simulators • Hybrid Simulation (combination) **2.Objective Structured Formats:** • OSCE (Objective Structured Clinical Examination) • OSPE (Objective Structured Practical Examination) • OSATS (Objective Structured Assessment of Technical Skills) • OSCA (Objective Structured Clinical Assessment) • OSVE (Objective Structured Video Examination) • OSTE (Objective Structured Teaching Examination) • TOSCE (Team Objective Structured Clinical Examination) • GOSCE (Group Objective Structured Clinical Examination) • OSLE (Objective Structured Long Examination) **3.Integrated Simulation Formats:** • Integrated Procedural Performance Instrument (IPPI) • Simulated Patient Encounters	**1.Individual Oral Exams:** • Structured Oral Examinations • Viva Voce • Oral Case Presentations **2.Panel Oral Exams:** • Objective Structured Oral Examination • Committee Oral Exams • Thesis/Dissertation Defense **3.Group Oral Exams:** • Group Oral Presentations • Team-Based Oral Discussions **4.Clinical Oral Exams:** • Long Case Presentations • Short Case Presentations • Bedside Oral Examinations	**1.Selected Response Items:** • Multiple Choice Questions (MCQs) • True/False Questions • Matching Questions • Extended Matching Items (EMIs) **2.Constructed Response Items:** • Short Answer Questions (SAQs) • Modified Essay Questions (MEQs) • Problem-Based Learning Assessments **3.Essay-Based Assessments:** • Traditional Essays • Reflective Essays • Critical Appraisal Papers **4.Online/Computer-Based:** • Computer-Based Testing (CBT) • Adaptive Assessments • E-Portfolios with Assessments

Breaking competence into parts: analytic frameworks

Having decided upon the destination, analytical approaches can assist in breaking down competence into its constituent parts for more detailed examination [5]. The hierarchy of competence according to Miller is an analytical approach as it consists of competence being assessed at four different levels—'knows', 'knows how', 'shows how', and 'does' [2,6]. The advantage of analytical models is that they enable teachers to choose the most suitable method of assessment for each level of competence, such as written tests for 'knows', objective structured clinical examinations for 'shows how', and workplace assessment for 'does' [19]. A limitation of these approaches is their reductionist nature.

Returning to the whole: synthetic frameworks

To overcome the limitations of analytic frameworks, synthetic frameworks take a holistic view of competence [5]. Instead of asking "Does the learner know this skill?"

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synthetic frameworks ask "Can the learner correctly perform this complete activity?" A key synthetic framework is the concept of Entrustable Professional Activities (EPAs), developed by Olle ten Cate [12,18]. An EPA is a discrete, essential activity in a medical profession that can be entrusted to an individual for independent performance. Examples include "initial assessment of a patient with chest pain" or "management of a diabetic patient in an outpatient clinic." Each EPA demands the integration of multiple competencies from different domains. The evaluation question becomes: "Can this learner be entrusted to perform this EPA?" The power of the EPA framework stems from its capacity to make abstract competency frameworks concrete and transform them into observable units of clinical work. For educators, EPAs offer clarity about what learners should be able to do. For learners, EPAs offer clarity about what they need to learn. For patient safety, EPAs provide transparency about how to determine if a learner can practice independently.

Viewing progress over time: developmental frameworks

If outcome-oriented models provide an account of the endpoint, and if synthetic models provide an account of the profession's work, then developmental models give an account of the evolutionary journey from novice to expert [5]. Developmental models emphasize that evaluation should be longitudinal, rather than cross-sectional. Van der Vleuten's programmatic evaluation applies this concept through the collection of information from a variety of sources and over time [10,16]. Assessment should not be regarded as an end in itself; rather, the process is intended to map the learner's developmental trajectory over time. Thus, the instructor's role goes beyond assessor and becomes mentor, while the learner's role becomes one of self-directed learning [10].

Ten Cate's three-layered model of competence: Integrating all frameworks

Finally, the synthesis by Ten Cate et al. (2024) is a tripartite model of competence [12]. The canonical component comprises the fundamental knowledge and skills that any professional must learn, referring to analytical models and Miller's knows dimension. The contextual component reflects the skill set to utilize canonical competence in various clinical settings, pertaining to synthetic models and Miller's does dimension. The personalized component refers to professional identity development and personal style apart from regular competencies, reflecting a highly competent individual who applies personal value, experience, and insight to create their distinctive practice style. Recognizing the hierarchy of defining learning objectives, analyzing components, synthesizing professional activities, and monitoring developmental progress can provide educators with a comprehensive framework on how to design an assessment system in medicine. To visualize the interconnections among these components, **Figure 1** presents a conceptual framework that integrates learning objectives, competencies, Entrustable Professional Activities (EPAs), assessment tools, and entrustment decisions. Assessment tools, mapped onto Miller's pyramid (written, oral, simulation, and workplace-based assessments), provide evidence of learner performance. This evidence informs entrustment decisions regarding the learner's level of independence. Crucially, the outcomes of these decisions feed back into refining the initial learning objectives, thereby establishing a continuous, programmatic cycle of assessment and improvement.

Implications for practice:

The conceptual distinctions in this article have practical implications for several groups.

For clinical teachers: this framework assists in aligning assessment tools to objectives—written tests for knowledge, OSCEs for simulated skills, and Mini-CEX or DOPS for authentic clinical performance. Understanding the skill-competency distinction prevents teachers from assessing only isolated skills and directs them toward evaluating integrated abilities in clinical contexts.

For administrators and curriculum planners: This framework supports designing competency-based curricula aligned with objectives, teaching methods, and assessments. Using the EPA framework, planners can base assessment on authentic professional tasks rather than completed rotations. Programmatic assessment guides them toward continuous, diverse assessments across the educational continuum.

For researchers: Questions for future research include how teachers' understanding of assessment terminology influences their evaluation decisions, the effect of teaching these concepts on assessment quality, and how culturally adapted frameworks can be designed for different health systems.

For policymakers: This framework can inform competency-based accreditation standards that focus on

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EPAs and entrustment decisions rather than merely counting educational activities, thereby better ensuring that graduates are prepared for independent practice.

For students and trainees: Understanding these concepts helps learners comprehend how they are evaluated and enables them to play a more active role in their learning. When learners understand formative versus summative assessment, competencies, and entrustment, they can more effectively seek feedback, document progress, and advocate for readiness.

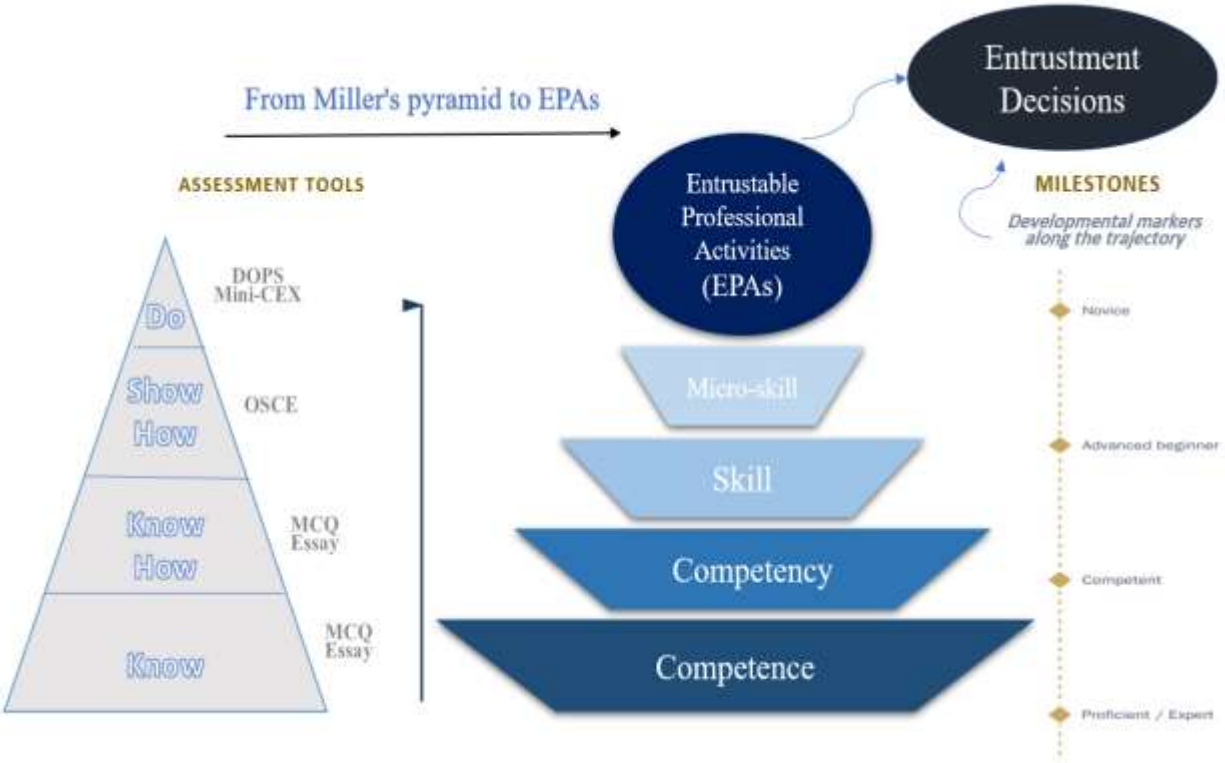


Figure 1. Conceptual framework integrating competencies, EPAs, assessment tools, and entrustment decisions in a programmatic assessment system

Note: The figure illustrates a continuous quality improvement cycle in assessment. At the top, Learning Objectives define the expected outcomes. These objectives are translated into Competencies and EPAs. In the middle layer, various Assessment Tools (categorized under Written, Oral, Simulation, and Workplace-Based) are mapped to Miller's pyramid levels (Knows, Knows how, Shows how, Does). The data generated from these tools feed into Entrustment Decisions, where supervisors determine the learner's level of independence (ranging from direct supervision to full autonomy). Finally, the entrustment outcomes are fed back to refine and update the initial learning objectives, closing the loop and promoting programmatic, longitudinal assessment.

Conclusion

Conceptual clarity is a fundamental requirement for an effective system of assessment in medicine. As discussed in this primer, competencies define goals, EPAs operationalise these goals into clinical tasks, and programmatic assessment monitors progress toward achieving them. Starting from basic definitions like those distinguishing between assessment and evaluation, and applying this knowledge to their existing assessment tools, by way of Miller's pyramid, clinicians can begin building an effective assessment system that produces competent doctors.

Ethical considerations

Not applicable

Artificial intelligence utilization for article writing

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Conflict of interest statement

None

Author contributions

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