

Student perspective on outcomes and process – recommendations for implementing Competency Based Medical Education

Short Title – Student Perspective – implications for CBME

Neill Storrar¹, David Hope¹, Helen Cameron^{1,2}

Centre for Medical Education, Edinburgh Medical School, The University of Edinburgh, The Chancellor's Building, 49 Little France Crescent, Edinburgh, EH16 4SB, United Kingdom

Aston Medical School, Aston University, Birmingham B4 7ET, United Kingdom

Correspondence Details

Dr. Neill Storrar

Centre for Medical Education

Edinburgh Medical School,

The University of Edinburgh

The Chancellor's Building,

49 Little France Crescent, Edinburgh

EH16 4SB

Scotland, United Kingdom

Neill.Storrar@ed.ac.uk; ORCID [0000-0002-4548-6468](https://orcid.org/0000-0002-4548-6468)

David.Hope@ed.ac.uk

Helen.Cameron@ed.ac.uk

0131 242 6651

Abstract

Purpose Competency Based Medical Education, seeks to prepare undergraduate and postgraduate trainees for clinical practice. Its major emphasis is on outcomes, but questions about how best to reach these remain. One key issue is the need to integrate what matters most to students when setting educational goals: this is crucial if we are to design curricula that trainees understand and engage with, and that promote successful achievement of competencies.

Method We interviewed medical students in years 4 and 6 of a 6 year medical degree and used thematic analysis to understand their main educational priorities and how these fit with the aims of CBME.

Results – Two major themes emerged: features of content and process. For content, students wanted clear guidance on what constitutes competence, finding broad outcome statements abstract and difficult to understand as novices. They also attach critical importance to features of process such as being welcomed, included in clinical teams and being known personally – these promote motivation, understanding and professional development.

Conclusions – We present recommendations for those designing CBME curricula to emphasise the student perspective: what kind guidance on outcomes is required, and features of process that must not be neglected if competence is to be achieved.

Key Words

Learning Outcomes

Outcome Based < Curriculum

Medicine < Profession

Clinical < Teaching & Learning

Education environment < Curriculum

Practice Points

Students want clear guidance on what constitutes competence – broad outcome statements are difficult for novices to understand

In focusing on competence, elements of process must not be forgotten. This includes promotion of inclusion, understanding by praxis, and providing opportunities for pursuing special interests at any time. This will promote student motivation for learning and achieving competence.

Notes on Contributors

Dr Neill Storrar is a doctor training in haematology, currently working as a clinical fellow in medical education. He is a fellow of the Higher Education Academy. His interests are in the learning environment and peer learning.

Dr David Hope is a psychometrician specialising in assessment and feedback. A fellow of the Higher Education Academy, he is closely involved in the assessment of undergraduate and postgraduate medical students. His previous work has received a Teaching Innovation Award from the International Association for Medical Education.

Professor Helen Cameron is the Dean of Medical Education at Aston Medical School and is leading the implementation of a new medical programme there. Previous to this she was Director of the Centre for Medical Education at the University of Edinburgh 2003-17 where she led educational innovation and research.

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Introduction

Competency-based medical education, CBME, emphasises that medical curricula should prepare students for real practice. Since studies continue to report medical graduates' lack of readiness for key roles such as acute care and team work (Tallentire et al. 2012, Monrouxe et al. 2017), it is clear that there is more work to be done. CBME is “an outcomes-based approach to the design, implementation, assessment, and evaluation of medical education programs, using an organizing framework of competencies” (Frank, Snell, et al. 2010); it relates competencies to what doctors need for safe practice, and examines how we assess and demonstrate competencies to regulatory stakeholders. Such competencies have been defined in multiple contexts such as the Canadian CanMEDS framework (Frank et al. 2015), and the UK General Medical Council's Outcomes for Graduates (GMC 2015). In the European context these standards are closely linked to the Bologna Process for harmonizing the way learning outcomes are specified and tied to course structure (Cumming and Ross 2007, Patrício and Harden 2010). The CBME movement is examining how to refine these outcomes (Englander et al. 2017) and redesign training to meet them, but has encountered challenges including problems of resource management, stresses on staff, and implementation problems (Holmboe et al. 2017).

A particularly important concern is how to integrate the student perspective in CBME. Medical students struggle to understand competency frameworks, with only 53% of students in one study agreeing that they understood the *language* of a 'milestone' competency assessment (Lomis et al. 2017). Furthermore, there is significant discrepancy between student self-reported competence and supervisor views: compared with supervisors, students over-estimated their ability in 11 out of 13 key clinical domains (Tallentire et al. 2011). These findings suggest a significant gap between the clinician's and trainee's understanding of good practice and a need to find better ways to indicate what is required of the learner. Bridging

this communication gap may be even more important for designers of national exams such as the United States Medical Licensing Exam (USMLE 2014), the planned UK medical licensing assessment (Melville 2017), and in new forms of assessment such as entrustable professional activities and milestones (Harris et al. 2017).

Despite the primary emphasis on curriculum outcomes, and the freedom that educators have to reach these (Frank, Snell, et al. 2010), CBME literature is also concerned with identifying aspects of process that are required, whether in assessment (Harris et al. 2017) or in the use of time, technology and staff development (Nousiainen et al. 2017). No freedom is absolute. Furthermore, regulators describe the process features required for a quality programme, in guidance such the GMC's 'Promoting Excellence' document (2016), and the World Federation for Medical Education's Quality Improvement Standards (WFME 2015). Such guidance is underpinned by research that finds that process variables such as class size or quality of feedback are better indicators of quality than educational products such as grades or postgraduate attainment (Gibbs 2010).

In summary, to implement CBME well we must describe the intended learning outcomes in ways that are clear to students and identify appropriate principles of process to help us reach these goals. Only then will we achieve 'constructive' alignment of teaching methods, assessment and goals (Biggs 1996).

When considering such curriculum design challenges, collaboration with students has been promoted to ensure their unique perspectives are included (Huppertz 1996, Visser et al. 1998, Finucane et al. 2001). Benefits include access to insights about the 'hidden curriculum' of tacit learning not formally taught (Snyder and Snyder 1973), student empowerment from involvement in decision making, preparation for future managerial work, and identifying content areas that students find particularly challenging (Visser et al. 1998). It is therefore imperative that we include student voice when considering design of CBME

curricula. We can seek student views on what is important, and consider how student views align with the stated goals of CBME.

This study used in-depth semi-structured interviews to explore what students consider most important in relation to their learning in an outcomes-based undergraduate medical curriculum aligned with a national competency framework. We aimed to identify features of training that students consider most important, and make comparisons with the aims set by CBME. We hoped to identify features of *effective* learning for competency achievement. This would allow us to work cooperatively with students in designing CBME curricula that they understand, promote achievement of competence, satisfy stakeholders, and ultimately benefit patient care.

Methods

This study was carried out in a 5-6-year undergraduate medical course in the UK. The programme delivers an outcomes-based curriculum aligned to the UK GMC's Outcomes for Graduates (GMC 2015), a national competency framework. Students typically enter directly from school, and up to 1/5 are from outside the UK. The course includes clinical exposure from the outset but Years 1 and 2 predominantly focus on basic sciences and medical humanities. Most students undertake an 'intercalated honours degree' in related science or humanities subjects in Year 3. In Years 4 to 6 the majority of the course is in the clinical environment: hospitals and community practice.

Given CBME's emphasis on preparation for practice, students in the more clinical years 4, and subsequently year 6, were invited by open invitation in person at the end of routine teaching sessions. Volunteers contacted the first author by email to arrange an interview.

Ethical safeguards to protect student confidentiality included strict data protection, private interview and use of aliases for quotations. So that participation could not prejudice

future student performance, the interviewer agreed to abstain from examining participants at future summative assessments. To allow informed consent, students were given written information and a copy of the consent form prior to attendance. Support contacts were provided in case of unexpectedly upsetting matters arising, and consent could be withdrawn where possible (data not embedded in analysis or publication). This study was approved by the College of Medicine and Veterinary Medicine Student Ethics Committee.

Students were interviewed for an hour. The researchers developed a semi-structured topic guide by consensus discussion. We explored questions of students' overall priorities and goals, and their perceptions of what was important in reaching these goals.

We used an inductive approach to allow priorities to be grouped by student responses rather than a pre-conceived framework, in keeping with a focus on student-led views.

Interview data were analysed using thematic analysis aiming to find latent themes to describe underlying concerns that might link related concerns across the study population (Braun and Clarke 2006). Coding was primarily by the first author, with review by the other two authors to ensure all relevant themes were considered and coherent. Coding proceeded through the steps suggested by Braun and Clarke: familiarisation, initial codes, search for themes, reviewing themes, theme definitions (Braun and Clarke 2006).

The theoretical framework was taken to be constructivist focusing on recreating student perceptions of what matters, while recognising that the researcher's own perspective influences the development of these perceptions and their analysis (Guba et al. 1994). The lead researcher therefore included self-interviewing to record his own position and views, and we considered how this may influence the data collection and analysis (Mauthner and Doucet 2003). Collection proceeded towards data sufficiency – the aim was not to provide an exhaustive 'data saturated' account of all possible student concerns (Varpio et al. 2017), but

identify common and recurring themes in an informative study population. Following 13 initial interviews, a further 3 students were recruited which satisfied our requirements.

Results

Our results identify students' main priorities at medical school and the features they consider important for reaching them. These goals are diverse, but analysis illuminated themes of *content* and *process* ([Table 1](#)). These have various components e.g. content includes achieving high exam scores and clinical competence; process includes having personalised teaching and fostering good relations with peers and patients. We expand on key features here. Quotations use pseudonyms.

Content

Students expressed a strong desire to know what is required to reach clinical competence. This was most evident in goals related to academic achievement. They value *detailed* outcomes and standards, and find high-level behavioural descriptors vague:

Rebecca: I know [infectious disease] is important, but how much about the importance of it and... the detail do you want me to know? [Some guidance is] much better: you need to know em... the typical presentation, the common drugs used to treat... the gold standard for diagnosis.. So it's more useful when you have specific stuff we need to learn about

Understanding outcomes goes beyond knowing what would come up in the end of year assessment. There is a genuine fear that patients may suffer if aspects of knowledge and skill are not known. We also noted a concern that emphasising skills such as communication and empathy without attention to knowledge content could impair competence:

Kelly: I'm just nervous I'm going to graduate and get out there and just sort of fail my patients because, you know, they come in with a symptom and I'm like, oh, that sucks, and can be nice to them and sympathetic but then have no idea what's wrong with them.

We found evidence that students wanted to be able to go beyond core competence and learn for its own sake – learning for this ‘sense of wonder’ (Table 1) was described as highly motivating:

Imran: I guess ideally you learn throughout the term and you're learning everything. Exam time, it's not fun to cram, but it is fun to learn. Actually knowing stuff I feel a bit more like a doctor. Learning for fun is far more interesting, or learning for the sake of learning rather just learning for the exam

Process

Across numerous clinical, academic and extracurricular goals, the crucial feature was inclusion. When students felt they were part of a team, had built relationships with their colleagues or peers, and were known as individuals, they saw learning as far more effective. Indeed these were considered valuable goals in themselves (Table 1).

Building relationships was partly about the need to be fairly judged and get personalised feedback, but such inclusion was also *motivating* for engagement with learning:

Robert: You can build a personal relationship with someone, even if it is relatively superficial, just for four weeks or whatever, you feel valued and therefore you feel more motivated to try and work at that particular topic.

In relation to preparation for practice students expressed a strong desire to learn by praxis – knowing the standard by taking part in real clinical care:

Robert: ward time is valuable [because] you get a list of conditions which can occur on the ward and therefore what you should know: the aspects of care that are required for them to be treated. So like if someone comes in with a heart valve issue you know you've

to do an echocardiogram. No one told me that in the first two weeks, but I learnt that from the ward because people were like, oh yes, he's waiting for his echo.

In addition, inclusion in clinical work promoted a sense of usefulness, encouraged students to work with their peers, and avoided perceptions of being marginalised or a burden to patients, a known risk with more passive observation:

Olga: I think there was always a sense that we aren't doing much...we aren't really contributing very much to their care and we just...yes, especially when we were taking history from patients with metastatic diseases who were in palliative care. I think they were generally still happy to speak to us but we did feel like that was very generous of them to go through that again.

Finally, these themes overlap, and it is important to note that priorities were not strictly stratified: students talked about balancing these, or choosing which to focus on at any one time:

Richard: if you can achieve that balance, if you can pass your exams clearly as well as doing plenty of other things, as well as meeting plenty of other non-medics, then if you can say you've done that, throughout your time in medical school, that would be great to look back on

Table 1 – Student Priorities grouped by Theme

Students were asked what mattered most at medical school and answers were grouped according to emergent themes. Some priorities had a greater emphasis on elements of content, and others on elements of process.

Focus on Content

Being the best

- Exams and Ranking
- *Curriculum vitae*

Preparation for Practice

- Competence
- Avoiding Error

Personal Development

- Non-technical skills
- Develop Wisdom
- Develop Autonomy
- A sense of wonder

Focus on Process

Being known and personal identity

- Recognition of achievement
- Personalised teaching and feedback
- Being welcome
- Reputation and prestige

Feeling Useful

- part of the team
- learn by praxis
- looking after patients
- Satisfying clinical experience

Good Relations

- Peers and family
- Staff and faculty
- Patients

Fairness and comparisons with peers

Being part of something big

Happiness and Stress Control

Discussion

We started by asking students about their general priorities and what matters in learning, and quickly reached a deeper understanding of features of content and process that identify strong reasons to include the student voice when planning implementation of CBME.

Students agree that preparation for practice is a key goal which fits with the overarching goal of CBME. However, they would like *very specific* guidance on the standards and content required for safe practice. They find high-level descriptions difficult, and have great anxiety about having ‘gaps’ in knowledge and ability. Students also expressed interest in learning *beyond* basic competence – learning for its own sake or pursuing special interests. This was reported to be highly motivating.

There was also significant concern with processes for reaching competence: how teaching is delivered and in which contexts. A main concern is with being known as an individual, receiving personalised feedback and support as well being useful as part of a team. Learning through participation in real patient care was important to identify what matters in clinical practice. Again this was linked to more effective achievement of CBME’s aims.

Previous critiques of learning outcomes have identified student difficulties in understanding terminology of outcomes (Prideaux 2004). In the more recent discussion of competency frameworks, some concerns were raised by students about the language of ‘milestone’ assessments (Lomis et al. 2017), which supports our findings. This study adds to this by pointing out how much stock students put in *detailed* content description as opposed to broad statements of intended competence or learning outcomes. There is a risk of reductionism with competency frameworks where lists of outcomes are split to unmanageable levels of detail (Frank, Snell, et al. 2010), but the opposite difficulty exists too: broad high level descriptors can frustrate students with their open-endedness. Such high-level

descriptors are found in the competency frameworks referenced above, and in Europe the Bologna process specifies that only a small number of broad programme outcomes are described, with a similar number of more granular outcomes for each module. Achieving the right level of detail to guide student learning is therefore problematic.

Proponents of CBME argue that it aims to ensure competence in dealing with the potentially limitless nature of learning (Holmboe et al. 2017) and is supported in this aim by formative assessment and feedback which helps students judge what is required to achieve the competence statements and progress (Harris et al. 2017). But this side-steps the challenge of how to indicate the required competencies to both trainees *and* their teachers in ways that are comprehensible and useful when preparing tomorrow's doctors for practice. Again this is pertinent for those designing and sitting national examinations, not least because traditional content-based assessments are likely to still be of use in CBME (Hawkins et al. 2015).

While students' desire for detailed guidance spoke of the need to know what the basic standard is, we also found views that questioned the focus on 'core' topics. When setting outcomes, 'dumbing down' to minimal competence is a known risk that must be countered by educators (Frank, Mungroo, et al. 2010). In this study, students added support to this view, expressing nervousness about minimal competence. Achieving a 'just passing' standard was considered inadequate, and students were concerned about encountering specialist situations and diseases they were not prepared to manage. This included areas of 'expert' knowledge beyond the immediate period after qualification.

Students also want to follow areas of non-essential study as part of a 'sense of wonder,' considering this highly motivating. While there is some suggestion that those who achieve competence quickly can then have their learning enriched in other ways (Nousiainen et al. 2017), this sequential detachment of 'basic' and 'extra' training would seem to defer the motivational element. Self-determination theory suggests that 'internal motivators' such as

patient-contact should be introduced early in curricula (Ten Cate et al. 2011); we suggest that ‘a sense of wonder’ related to special interest is such an internal motivator.

Others have also identified concerns with process versus outcomes, arguing that if the emphasis is heavily on outcomes then students risk being overlooked and disengaged (Rees 2004). Students in this study identify the powerful impact of inclusion on their efforts to learn. Again this can be viewed from a self-determination perspective, reflecting the importance of a sense of belonging / relatedness as one of 3 key components of internal motivation (Ryan and Deci in Kusurkar et al., 2012). Inclusion of students can have service benefits too, where students add value to clinical care (Gonzalo et. al 2017).

Finally, we find that inclusion incorporates development of personal identity, a feeling of welcome and psychological support, and mitigation of stresses of student-faculty interactions. If CBME were to focus *only* on measurement of competencies in the workplace it could alienate learners (Brightwell and Grant 2013). For example, a clinical clerkship that includes frequent contact with supervisors might allow their competence to be assessed well, but this does not necessarily make learners feel supported. Educators must find ways to balance the requirements of assessment with pastoral needs.

Recommendations

The exploration of student perspectives on learning outcomes or CBME leads us to suggest several key recommendations.

If we are to avoid confusing or disengaging students, curriculum information must include detailed guidance on what constitutes competence, developed with and for students. Guidance should be clear enough to be understood by novices at the outset of each stage of learning, and truly help them prepare for clinical responsibilities *and* assessment. Broad outcomes statements should be complemented by descriptions of content that detail the

contexts of practice -such as key presentations, diseases and settings - that students should *prioritise* in their learning. This might necessitate modification of international or national guidance on how to define outcomes, particularly where national assessments are required. While new approaches to feedback and assessments such as EPAs may also help learners understand what they need to achieve (Harris et al. 2017), there remains the possibility that teachers may not have a shared view of the priorities in the absence of details. The USMLE and the planned UK MLA are likely to continue to use traditional forms of assessments (USMLE 2014, Melville 2017); thus student-centred guidance on what learning to prioritise for these national assessments is key.

Complementing this guidance, and in common with others interested in CBME, we emphasise the importance of learning by real involvement in clinical environments and integration in clinical teams (Carraccio and Englander 2013). This can aid fair assessment of competence, (Lockyer et al. 2017), but practical experience will also add *salience* to what can be abstract outcomes. This can be achieved through greater workplace integration, for example in student apprenticeships (GMC 2009).

We also advise caution in the sequential separation of ‘basic’ and ‘extra’ learning, because of the risk of hampering internal motivation outlined above. We support calls for better understanding the role of self-determination in relation to competence (Ten Cate et al. 2011, Gruppen et al. 2017).

The tension between inclusion and workplace assessment must also be recognised, and we recommend caution when clinicians are given dual roles as assessors and teachers.

Strengths and Limitations

This study used rigorous methodology to explore the concerns of medical students on clinical placements, a highly relevant group when considering preparation for practice. Open

questioning allowed students to highlight all areas that matter – even if we had not considered them previously - rather than forcing the question to be about learning outcomes or competency approaches directly. The thematic analysis using an interpretive framework appropriate to the question, and individual interviews allowed us to confront inconsistencies, and develop underlying connections.

Regarding transferability of findings, while the study is not in a fully-fledged CBME curriculum, it is from an outcomes-based curriculum aligned to a competency framework; these findings are likely to resonate with other institutions in a similar position. Saturation is a potential issue, but we argue that it was sufficient – the detailed interviews, rapid development of important themes and focus on one area of interest (student main goals) all argue for a smaller sample size (Varpio et al. 2017). After an initial sample of 13 students we interviewed 3 more and no significant new themes were identified. While a larger sample could have uncovered other priorities we consider it unlikely that the core concerns of process and content would be significantly different.

Consideration of the researchers' roles is important (Mauthner and Doucet 2003). The first author is a physician who trained in the same university as the students. His research interest is in learning in the clinical environment. Although we introduced the notions of content and process in the introduction to this manuscript, these were themes that emerged over the course of the data analysis. Still, we recognise that theme development is not inextricable from the researcher's interest in improving educational methods, which includes ideas of process.

Conclusions

This paper has identified matters of importance to students that educators must attend to if they are to collaborate with students for effective curriculum design.

First, we emphasise the challenges in communicating outcomes: students continue to express the need for detailed guidance on what they need to know and do. This remains important even in competency-based approaches. This will help align what students and staff consider to be good practice.

Second, inclusion of students in teams and working environments goes beyond developing reliable or valid workplace-assessment of competency. Inclusion is itself a marker of quality education where students are valued and develop their professional identities in nurturing surroundings. We note that the need to assess in the workplace may conflict with the need for support and inclusion: there are potential tensions between assessing competency and student inclusion.

Future work should address:

- Experience of implementing policies and curriculum design approaches that integrate these concerns
- The impact of detailed guidance on student comprehension and achievement of outcomes and competencies.
- Identifying optimal methods to achieve a balance between authentic workplace based assessment and providing students with a sense of inclusion and support.

Incorporating these issues of content and process in curriculum design is difficult, and requires good process management. We strongly emphasise the importance of process not just as a means to reach competence but as an end in itself.

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