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LITERATURE REVIEW ON CORE ASSESSMENT PRINCIPLES OF COMPETENCY BASED MEDICAL EDUCATION CBME

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ABSTRACT

The purpose of this study is to review the literature on competency-based medical education (CBME) principles and to identify some preventative strategies. Integrating competency-based medical education (CBME) into the standard curriculum is a significant difficulty. This study emphasize its practical implementation.

Keywords: *competency-based medical education (CBME), Curriculum, Medical education*

INTRODUCTION

Competency-based medical education, or CBME, is based on an assessment program that is integrated into an efficient teaching framework and uses a variety of methods and assessors.

The meaningful assessment of competence is a significant obstacle to the implementation of competency-based medical education (CBME)..(Lockyer, Carraccio et al. 2017). With the goal of increasing interdependence among health care professionals with a focused responsibility for patient safety, the shift to CBME has increased awareness of the difficulties and limitations of current methods of assessment and highlighted the need to develop methods to assess the competencies expected from physicians. (Harris, Bhanji et al. 2017).

Assessment in CBME is primarily used to promote learning, with a secondary goal of determining progress readiness. (Van der Vleuten, Schuwirth et al. 2010).

Core Assessment Principles of CBME:

The first step in planning CBME assessments is to determine what information is necessary to achieve goals.

Miller (1990) distinguished four learning tiers. When formative feedback is offered, the assessment strategies associated with each level both inform and support learning as well as assessment. Assessments are integrated into real-world work and learning contexts at the DOES level. Learning provides health professionals with a stronger foundation in the cognitive process of making clinical decisions.(Eva 2005)

(Miller 1990)

Formative assessment: The learner should do the assessment in conjunction with them. Two approaches that address this include informed self-assessment, in which the learner is urged to gather information from reliable internal and external sources to direct their learning.(Sargeant, Armson et al. 2010) and the utilization of portfolios, which

motivate students to record and consider their(Van Tartwijk and Driessen 2009) own learning.
The value of both techniques lies in their capacity to enhance performance. Reflection on action as well as reflection in action are components of self-assessment. We refer to this type of behaviour as self-directed assessment seeking**.**

(Pelgrim, Kramer et al. 2013).
Assessment of learning:
Summative Assessment
Assessment has always placed a strong emphasis on learning objectives like acquiring skills or knowledge in a controlled setting. The move in CBME towards work-based assessment takes into account how healthcare professionals' competencies affect the quality of care they provide to patients.(Kogan, Holmboe et al. 2013)
Following the identification of the program's intended learning outcomes, medical educators should employ assessments that guarantee accurate evaluation of those outcomes. Additionally, during the program, feedback should be provided on a frequent basis utilizing efficient techniques.
(Lee, Chiu et al. 2022).

PRINCIPLES OF ASSESSMENT:
1. **Validity:** Assess the extent to which the assessment measure what it intends to measure This involves content validity, cognitive validity, structural validity, generalizability, external validity and consequential validity.(Messick 1995)
2. Reliability: The degree to which a test actually assesses what it is intended to measure is known as assessment validity. It is crucial to remember that a test may be valid but dependable at the same time.
3. Reliability is denoted by reliability coefficients and is defined by Classical Test Theory (CTT) as the ratio of true score variance to observed score variance. The true score and error are combined to create the observed score in CTT. Reliability coefficients, which are often stated as a coefficient ranging from 0 (no reliability) to 1 (perfect reliability), are therefore used to quantify the level of measurement inaccuracy in evaluations. Low dependability indicates a high error component in the evaluation, which means the findings are meaningless. There is no set threshold to separate "reliable" from "unreliable" scores, even though more reliability is always preferred**.**(Gupta and Research 2023)
4. **Fairness:** When candidates' needs and qualities are taken into consideration, and when the evaluation is mutually agreed upon by assessors and candidates, it is considered fair. One of the four assessment tenets is fairness. Fairness must be incorporated into the instrument while creating assessment instruments.(Reap, Roman et al. 2008, Inau, Sack et al. 2021)
5. **Transparency:** It is generally agreed upon in higher education that "transparent" assessment criteria are preferable. Transparency in this context refers to teachers being clear about what they expect from assessments so that students know what's expected of them. Transparency is often used to describe student understanding of the assessment's goal and criteria. All assignments, evaluation criteria, and standards must be clear to students and teachers in order to instruct and enhance [a] student's performance.(Bloxham, den-Outer et al. 2016, Bearman and Ajjawi 2018)
The assessment practices in our institution mostly align with principles of assessment to ensure effective evaluation of student's competencies.
Critical evaluation could focus on the alignment of assessments with learning objectives, the consistency of evaluation across various assessments, fairness in accommodating diverse student needs, and the transparency and effectiveness of feedback mechanisms. Ensuring assessments adhere to these principles enhances their reliability, validity, fairness, and transparency, ultimately contributing to(Furqan, Akhtar et al. 2020) a more robust evaluation system that supports student learning and development.

Assessment evaluation in CTT and IRT
Assessment within medical colleges is a crucial component in evaluating student performance and ensuring quality of education. Here is critical evaluation of their application within context of our medical college.
Classical test theory and Item Response theory represents two distinct paradigms for assessing the performance of individuals in various domains, including medica education. Each theory offers unique perspectives on test development, reliability and validity, contributing to the overall understanding of assessment practices.(Magno and

assessment 2009, De Champlain 2010, Thomas 2011).

Classical Test Theory: It has been traditional approach to test evaluation and has several key components

1. **Reliability and Validity: CTT** emphasizes reliability through metrics like Cronbach alpha which measures internal consistency, and test-retest reliability. It also addresses validity through face, content and criterion-related validity.

2. **Total Test Score Focus**: CTT primarily focuses on the total test score, treating each item as equally contributing to the overall score.

3. **Assumption of Equal Item Difficulty :** CTT assumes that items have consistent difficulty across different test -takers

While CTT offers a straightforward approach and has been widely used, it has some limitations

Item Dependence Ignored: CTT does not explicitly consider item characteristics or interactions CTT does not explicitly consider item characteristics or interactions, assuming independence among items. This overlooks the potential for certain items to be related or for a student to perform well on one item but poorly on another despite similar abilities.

Inadequate Item Analysis: CTT doesn't provide detailed information about individual items. It lacks insights into item discrimination, which is crucial in distinguishing between high and low-performing students.

Unreliable Measurements: Reliability estimates from CTT might be influenced by test length, which could affect the consistency of measurement.

ITEM RESPONSE THEORY

In contrast, IRT offers a Smore sophisticated approach.

1. **Focus on Item Characteristics:** IRT evaluates each item characteristics, such as its difficulty and discrimination parameters. It considers how each item functions across the ability continuum

2. **Accounting for item Difficulty Variation:** IRT acknowledges that items can have varying levels of difficulty and provides a more nuanced understanding of how test- takers perform on different items ba(Arifin and Yusoff 2017)sed on their abilities.

3. **Adaptive Testing:** IRT allows for adaptive testing, where the difficulty of subsequent items is adjusted based on the test-takers performance. This tailored approach offers more precise estimation of an individual's ability.

However, IRT also has its challenges:

1. Complexity: IRT models can be complex to implement and require a considerable amount of data for accurate calibration.

2. **Assumption Sensitivity: IRT models a**ssume one-dimensionality a local independence of items, and absence of different item functioning (DIF) . Violations of these assumptions can affect the accuracy of the results(Van de Vijver, Avvisati et al. 2019, Fox 2020).

Application in Medical College Assessments

In the context of a medical college, both CTT and IRT have their strengths and limitations. CTT, with its simplicity, might suffice for general assessments, providing a broad overview of student performance. It can be valuable for assessing the reliability of overall scores and identifying problematic items in tests.

However, considering the complexity of medical education and the need for precise evaluation, in cooperating IRT could offer significant advantages. Medical examination often includes items of varying difficulty levels, and IRT ability to handle such variation can help in estimation of student abilities.

It can also enable the creation of tailored assessments that adapt to individual student proficiencies, offering a more personalized evaluation.

Conclusion Points:

1. **Reliability:** Upholding reliability ensures consistent measurement of student abilities. Assessments should yield consistent results over time, reflecting students' knowledge and skills reliably.

2. **Validity:** Valid assessments accurately measure intended skills and knowledge. They align closely with curriculum objectives, ensuring that students are evaluated on relevant competencies.

3. **Fairness:** Fair assessments provide an equal opportunity for all students. They should be free from biases, accommodate diverse learning needs, and ensure no disadvantage based on cultural or demographic factors.

4. **Transparency:** Transparent assessments have clear criteria, grading rubrics, and effective feedback mechanisms. Students should understand how they are evaluated and receive constructive feedback to aid their learning.

Conclusion:

In conclusion, an effective assessment system in a medical college aligns assessments with these principles. It promotes reliable and valid measurement of student competencies, ensures fairness for all students, and provides transparent evaluation processes that facilitate learning and growth. Continual evaluation and refinement of assessment practices in line with these principles are vital in fostering a conducive learning environment and producing competent medical professionals.

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