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Integrated assessment in medical education

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Background Integrated assessment has become imperative especially after applying the new integrated curriculum.
Aim To shed the light on some strategies for incorporating integrated assessment when implementing the new integrated curriculum.
Conclusion Integrated assessments must be applied in educational institutions. These assessments provide important ways to enhance student outcomes. Several strategies could be applied which should be selected in accordance to students' learning outcome.

Introduction

Learning is by connecting things. If you cannot connect you cannot learn

"Lord Chesterton"

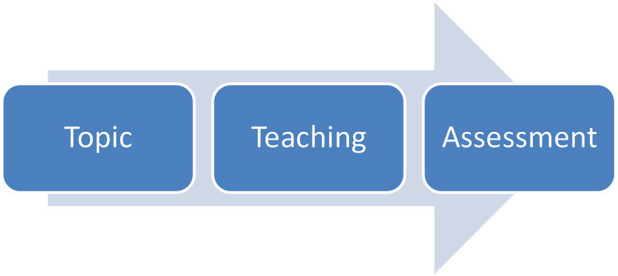
Integration must be considered as an educational strategy. And assessing how students use that basic science content in clinical reasoning or in the performance of a skill would provide valuable evidence for the effectiveness of a specific integration education strategy.

Integrated Curriculum Needs Integrated Assessment

Integrated assessments in medical schools provide an engaging and creative learning platform that closely links graduate doctors (day one doctor) to real life i.e., what will he/she experience in their practice.

Integrated assessment is a process that combines and blends the learning outcomes from multiple modules into a series of streamlined, realistic, case-oriented activities. These assessments are conducted over a period of time with numerous formative and summative components.

Assessments no longer take on the feared final exams i.e., no more traditional assessment model of "topic–teach–assess graduate".



The normal emphasis on the assessment of knowledge and skills in separate disciplinaries is replaced by measures of knowledge and skills blended into seamless assessment components that occur naturally (Fig. 1). This creates experienced doctors ready for the workplace (healthcare institute).

There is no right or wrong assessment strategy, there are only various ways of attempting to determine what a student knows and what he/she is able to do.

Measurement tools or strategies are only as good as their relationship to the goals and expected outcomes which have been established for a module.

Lectures' objectives and outcomes must be written in a way as to encourage a broad range of assessment strategies which will measure a student's performance and knowledge of processes on a learning activity or project.

Teachers should select an assessment strategy or strategies, which are "most" relevant to their students' learning outcome.

Assessment strategies

Assessment strategies may include:
1. Authentic assessment
2. Performance assessment
3. Systematic observations
4. Portfolios and journals

Authentic Assessment

Authentic assessment is a term which has been coined to describe alternative assessment methods. These methods should authentically allow a student to demonstrate their ability to perform tasks, solve problems or express knowledge in ways which simulate situations which are found in real life (Hymes, 1991).[1] According to Hart (1994)[2] the assessment strategy which fits these criteria is a combination of:

1. Performance assessment,
2. Systematic observations, and
3. Portfolios.

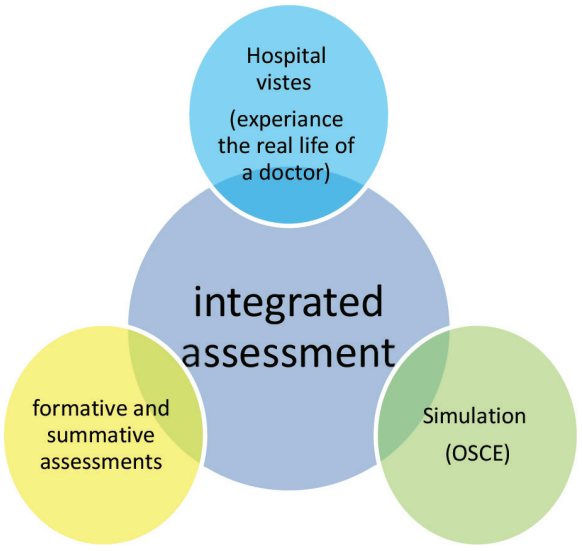


Fig. 1 **Types of integrated assessment.**

Performance Assessment

a. Developed to "test" the ability of students to demonstrate their knowledge and skills (what they know and can do) in a variety of "realistic" situations and contexts.[3]
b. Can be short or extended open-ended or multiple choice questions. In a more extended definition, performance assessments can be reading or writing, projects, processes, problem solving, analytical tasks or other tasks which allow the student to demonstrate their ability to meet specified outcomes and goals.[4]

Systematic Observations

Means that "all" students are observed regularly. Observations are recorded for both typical and atypical behaviour. Then these observations are reflected upon by the observer and interpreted to guide students' to meeting the lesson outcomes and goal(s).[4]

The key to useful observation is that they must be systematic. Observations are only useful if the "data" is recorded, evaluated and used to improve student performance.

Portfolios

- Portfolios are collections of students' skills, ideas, interests and accomplishments that span a period of time (Hart, 1994).[2] A portfolio may represent one discipline or any number of disciplines.

Portfolios are often taken on either the physical appearance of folders, binders or notebooks.

Or there are electronic portfolios which use multimedia and hypermedia to display the students' work.

The following are the examples on how to implement integrated assessment in an integrated curriculum:

– Combinations of multiple-choice questions (self-assessment questions or SAQs) with essay questions (termed Concept Appraisals or CAPPs) that ask learners to provide a narrative interpretation of the mechanisms behind or reasons for the findings in a clinical scenario.[5,6]
– Wood and colleagues[7] describe a validation study of a Clinical Reasoning Exercise in which learners are asked to write a single paragraph explaining the mechanisms behind a particular patient problem (Wood et al. 2009)[8]; these assignments are then graded by independent raters to assess whether learners' performance on this exercise correlates with other measures.
– Williams and Klamen (2012)[9] have described a Diagnostic Justification Exercise used with simulated patient encounters in which learners are asked to develop a differential diagnosis and explain their rationale for including the diseases/ conditions on that differential (ILA).
– Concept maps represent another strategy for assessing integration of knowledge. McGaghie et al. (2000)[10] demonstrated that students' maps regarding pulmonary physiology concepts became more coherent as a result of participating in an instructional unit on respiratory physiology, and the maps became more similar to maps developed by their instructors (Fig. 2).
– Longer essays have also been suggested as a means for assessing students' integration of knowledge from a problem-based-learning case. For example, Ferguson (2006, 1997)[11,12] describes a method by which individual learners are asked to write a narrative about a case that they have studied in small groups over several weeks. The learner is asked to write, *in the form of a conversation with a patient*, how the patient's signs, symptoms and laboratory and imaging results relate to underlying mechanisms of disease, how the treatment recommendations are based on this understanding, and what the patient can expect from the disease and treatment. Writing the narrative in the form of a conversation accomplishes an additional purpose of practicing the skill of explaining difficult concepts in understandable terms.

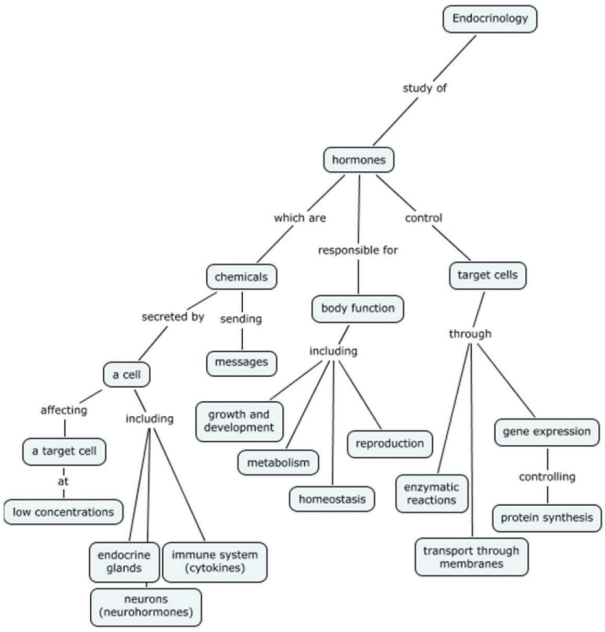


Fig. 2 **Concept map of the definition of endocrinology.**

- Progress tests have been used extensively in Europe to assess integration across courses. These tests are given periodically throughout the curriculum, and the items are intended to test cumulative knowledge across courses and vertically across the curriculum. Progress tests provide a unique opportunity for assessing growth in students' knowledge (Williams et al. 2012),[9] and can provide data on based on decisions about the curriculum as a whole as well as remediation strategies for the individual student. To accomplish these goals, however, requires significant investment of faculty and administrative time to develop item banks and ensure that exams remain relevant.

Swanson and Case (1997)[13] provide examples of multiple-choice questions based on patient scenarios that test integration of basic science and clinical knowledge. In addition, they have suggested that open-book exams, especially those that require learners to apply scientific literature, may be especially helpful in assessing higher-order thinking skills such as integration of material. An additional benefit is that such exams drive faculty to write questions that cannot be answered by turning to a page in a book.

Assessment in Clinical Education

During clinical education, assessing learners' ability to apply basic science concepts through their diagnostic reasoning

skills often occurs in the context of patient care. Bowen (2006)[14] identifies learner skills in six areas:

1. data acquisition and reporting,
2. problem representation,
3. generation of hypotheses,
4. identifying appropriate diagnoses on the differential,
5. having relevant experience for the case, and
6. general presentation/organisational skills.

She identifies clues that will uncover deficits in each of these areas and offers educational strategies for addressing each of them during clinical education. She further suggests that clinical teachers should ". . . encourage reading that promotes conceptualization rather than memorization."

Rubrics for Integrated Assessment

A rubric is a great tool for teachers, because it is a simple way to set up grading criteria for assignments. Not only is this tool useful for teachers, it is also helpful for students as well. A rubric defines in writing what is expected of the student to get a particular grade on an assignment.

A good rubric describes levels of quality for each criterion. These levels of performance may be written as different ratings (e.g., Excellent, Good, Needs Improvement) or as numerical scores (e.g., 4, 3, 2, 1).

Why Rubrics for Integrated Assessment

The following points tell as why rubrics are preferred for integrated assessment:

- measure outcomes based on real-life criteria
- specify performance indicators
- ensure consistent assessment
- improve the quality of assessment

Conclusion

Integrated assessments must be applied in educational institutions. These assessments provide important ways to enhance student outcomes. Several strategies could be applied all should be selected in accordance to students' learning outcome.

References

1. Hymes DL, Chafin AE, Gonder P. The changing face of testing and assessment; problems and solutions. Arlington, VA: American Association of School Administrators; 1991. p. 102.
2. Hart D. Authentic assessment: a handbook for educators. Menlo Park, CA: Addison-Wesley Pub. Co.; 1994.
3. Wiggins GP. Assessing student performance. San Francisco: Jossey-Bass Publishers; 1993.
4. Sowell EJ. Curriculum: an integrative introduction. New Jersey: Prentice-Hall Inc.; 1996.
5. Bierer SB, Dannefer EF, Taylor C, Hall P, Hull AL. Methods to assess students' acquisition, application and integration of basic science knowledge in an innovative competency-based curriculum. Med Teach 2008;30:e171–e177. doi: http://dx.doi.org/10.1080/01421590802139740 PMID: 18777415
6. Bierer SB, Taylor CA, Dannefer EF. Evaluation of essay questions used to assess medical students' application and integration of basic and clinical science knowledge. Teach Learn Med 2009;21(4):344–50.
7. Woods NN, Brooks LR, Norman GR. The value of basic science in clinical diagnosis: creating coherence among signs and symptoms. Med Educ 2005;39:107–12.
8. Wood TJ, Cunnington JPW, Norman GR. Assessing the measurement properties of a clinical reasoning exercise. Teach Learn Med 2009;12: 196–200.
9. Williams RG, Klamen DL. Examining the diagnostic justification abilities of fourth-year medical students. Acad Med 2012;87:1008–14.
10. McGaghie WC, McCrimmon DR, Mitchell G, Thompson JA, Ravitch MM. Quantitative concept mapping in pulmonary physiology: Comparison of student and faculty knowledge structures. Adv Physiol Ed 2000;23:72–81.
11. Ferguson KJ. Beyond multiple-choice questions: Using case-based learning patient questions to assess clinical reasoning. Med Educ 2006;40:1142.
12. Ferguson KJ, Steiner LA, Kreiter CD, Pomrehn PR. Assessment of case-based learning within a hybrid curriculum. Presentation at the Association of American Medical Colleges Research in Medical Education Annual Meeting, Washington, DC, 4 November 1997.
13. Swanson DB, Case SM. Assessment in basic science instruction: Directions for practice and research. Adv Health Sci Educ 1997;2:71–84.
14. Bowen JL. Educational strategies to promote clinical diagnostic reasoning. N Engl J Med 2006;355:2217–25.