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Developing outcomes assessments for collaborative, cross-institutional benchmarking: Progress of the Australian Medical Assessment Collaboration

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Developing outcomes assessments for collaborative, cross-institutional benchmarking: Progress of the Australian Medical Assessment Collaboration

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Abstract

Background: The Australian Medical Assessment Collaboration (AMAC) began in 2010. This article charts the development of the collaboration over its initial years.

Aims: AMAC was instigated as a way of improving the quality of medical education through the recognition of the need for tools for comparison and evaluation of learning outcomes, acknowledgement of the need for high quality assessment, and to share expertise in these areas. In a climate of increasing regulation and accountability, this collaboration was formed as a means of increasing assessment practices by, with and for medical schools.

Method: This article provides an overview of the background issues stimulating the development of AMAC, discussion of the formation of the collaboration and reflection on the lessons learnt through these processes.

Results: In a relatively short space of time, AMAC has fostered substantial collaboration among schools; developed an Assessment Framework, items and an online assessment; and provided benchmarking reports to students and schools.

Conclusion: The intention here is to provide guidance for others (within the medical education community and those in other disciplines) with similar intentions and aims, by outlining the developmental pathway of the project and the systematic lessons that the collaboration team has learnt in establishing AMAC.

Introduction

Medical education provided by universities is vital in developing the foundation of high quality and highly skilled future doctors. Across the world, the role of medical educators in enabling their students to develop the necessary skills, knowledge, attitudes and behaviours to fulfil their future roles is held in high regard. In general, the practices, processes and assessments employed within medical schools are some of the most rigorous and well developed within modern universities. However, until recently medical schools in much of the world have largely undertaken assessment of student performance in isolation from each other (Schuwirth 2007). This article explores an approach to change this being developed in Australia.

The Australian Medical Assessment Collaboration (AMAC) was developed between 2010 and 2012 as a partnership between the University of Queensland, Monash University and the Australian Council for Educational Research, and funded by the Australian Learning and Teaching Council. From 2013 onwards the collaboration expanded to incorporate 16 medical schools in Australia and New Zealand, with development funding provided by the Australian Government's Office for Learning and Teaching.

Practice points

- Having well-developed tools that help monitor learning outcomes of students is becoming increasingly important in medical education as governments and health authorities demand increasing accountability.
- Collaboration among medical schools and assessment experts can produce tools offering meaningful data for self-regulation and continuous improvement within medical education.
- AMAC is a collaboration of medical schools developed to provide quality data for comparing student outcomes while ownership and control over the content and quality is maintained by the schools.
- The development pathway AMAC followed provides insights into how such collaborations can be established.

AMAC was instigated as a way of improving the quality of medical education in Australia through the recognition of the need for quality comparison, sharing of expertise and acknowledgement of the need for high-quality assessment. The collaboration was built around the idea of cooperation

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between schools to improve assessment development and create an additional tool for monitoring quality that complements those already used, such as existing in-school assessments and the rigorous accreditation by the Australian Medical Council (AMC).

The development of the collaboration comes at the beginning of a new era of accountability for Australian higher education, signalled by the establishment of the national Tertiary Education Quality Standards Agency (TEQSA), the development of mission-based compacts for universities and work towards establishing a regulatory and quality framework (Australian Government 2009), and in medicine, with the establishment of the Australian Health Professions Regulatory Agency (AHPRA). AMAC aims to work towards the overarching goals of government, based around continuous improvement. However, the approach of the project partners is premised on the idea that a key means of achieving this is through *collaboration* by schools in the development of high-quality instruments for assessing and monitoring quality. In essence, AMAC aims to create tools for multi-institutional collaborative assessments that enable ongoing self-regulation of the profession through the evaluation of learning outcomes.

Focussing on the benefits of collaborative assessment and self-regulation, we examine the processes of how AMAC came to being and detail the initial development of the collaboration. The intention here is to provide guidance for others with similar intentions and aims, by outlining the developmental pathway of the project and the systematic lessons that the collaboration team has learnt in initial development.

Background

Growing internationalisation of the medical profession, increasing diversification of programs and curricula, and ever-growing pressure to improve academic standards heightens the need for robust assessment in medical education. In recent years, there have been numerous calls for Australian medical students to be assessed against national competency standards to ensure that they have requisite core skills. Contemporary discussion has been prompted by the Australian Medical Education Study that found some students graduate with “deficiencies in a number of clinical and procedural skills” as well as “inadequate knowledge of many of the basic medical science foundations” (DEEWR 2008:14).

From the perspective of educational assessment, the last few years have seen considerable growing national and international interest in and recognition of the policy importance of assessing learning outcomes through objective, system-wide testing. With the OECD playing an important role through its Assessment of Higher Education Learning Outcomes (AHELO) Feasibility Study, which involved development of assessments to be used across different countries to examine learning outcomes (Coates & Richardson 2011). The participation of 17 countries in testing across three domains – economics, civil engineering and generic skills – highlights the international appetite for such developments.

Separately, but in response to many common drivers, interest in implementing international medical assessments is

also gaining pace, particularly in Europe (Van der Vleuten et al. 2004; Archer 2009; Gorsira 2009; Harden 2009; Schuwirth 2010; Van der Vleuten 2009) and the UK through the Medical Schools Council Assessment Alliance (MSC-AA). System-wide testing is well established in North America through the US Medical Licensing Examination (USMLE) and the Medical Council of Canada’s qualifying examinations (Melnick 2009), although the approaches used there are closer to a “top down” rather than the “bottom-up” or self-regulating (Funder 2010) approach supported by AMAC.

Understandably, medical education in Australia sets high standards for innovation and excellence. The Australian Medical Council (AMC) conducts standards-based program accreditations. Admissions processes for entry to medical schools are based on world-class assessments, assuring the capability of students on entry (AMC 2010). A reflective approach to teaching and assessment drives ongoing improvement. Institutions deploy diverse quality assurance processes – peer review, moderation, feedback surveys – to monitor and ensure program quality.

Yet despite progress and the existence of ongoing measures, there remains a persistent lack of generalisable information about what students have actually achieved and whether they are capable to work as competent doctors. AMAC aims to help establish a mechanism for informing these issues at a national level so as to strengthen medical programs and medical graduates, and maintain quality across the country in concert with the self-regulating nature of the profession (Funder 2010). Establishing a national and standardised approach is also seen as important because of the limited cross-institutional materials or data to support prevailing assumptions about the quality of medical graduates.

Existing developments in medical assessment collaborations

As the discussion above suggests, medical education is in many ways at the forefront of collaborative assessment exercises and exploration of assessing learning outcomes. While the focus below is on Australian collaborations, internationally, the range of collaborative partnerships in medical education is also increasing. Stand-out examples of collaborations include the Dutch progress testing group (Van der Vleuten et al. 2004), the UK MSC-AA launched in 2010 as a collaboration of medical schools working towards shared assessment items as an alternative to the introduction of a national licensing exam (MSC-AA 2013) and a collaboration of medical schools in Berlin, Heidelberg and Munich building assessments, item banks and delivery software known as Item Management System (IMSm) (IMSm 2013).

In the Australian context, the Australian Medical Schools Assessment Collaboration (AMSAC), operated through the University of Sydney involves a group of about seven medical schools. This collaboration focuses on developing biomedical sciences items which are embedded in university examinations around the mid-point of the medical degree, marking the transition from campus-based to clinic-based learning environments. Student outcomes on these items benchmarked across schools in the collaboration.

Australian Collaboration for Clinical Assessment in Medicine (ACCLAiM) is a group of four medical schools (Deakin University, James Cook University, University of Wollongong and University of Tasmania). ACCLAiM members collaborate on developing and using common clinical assessment instruments such as Objective Structured Clinical Examinations (OSCEs). Results are used for benchmarking graduate outcomes across schools.

International Database for Enhanced Assessments and Learning (IDEAL) is another tool used by numerous Australian medical schools for obtaining and sharing assessment items. IDEAL, based at Bond University, has 29 partner schools around the world who work towards generating databanks of summative and formative assessment items. Schools contribute to the databank and also generate assessments based on the items submitted by other schools.

In addition to the above projects, the AMC has implemented programs whereby items from the AMC exams for international medical graduates are used within assessments to benchmark performance of these assessment items against Australian students.

These efforts reflect positively upon the collaborative nature of medical education in Australia. AMAC adds to the diversity of these collaborations and offers a complementary role, focusing on the pre-internship period of the medical degree, aiming to assess a broad range of competencies and providing quality comparisons of learning outcomes and processes while also promoting awareness and skills in the practice of item and assessment development.

As with all of the collaborative initiatives outlined here, the approach of AMAC is built around the recognition that pooling resources in the important area of assessment is not only a more economical approach than has traditionally been the case, but is likely to result in higher-quality items and improved assessment practices.

While this approach seems obvious, it has not been the norm in Australia or in many other countries in the past. Van der Vleuten et al. (2004) note in the European context that two paradoxes tend to exist in this area. First, they highlight that “the ultimate benchmark by which the quality of our students is measured is the quality of our examinations”, but paradoxically while students are rigorously tested and measured through assessments, quality control procedures for assessment development are rare (p. 719). Second, that “as individual teachers and schools, we jealously guard our test material, precisely because it is so time consuming and costly to produce” (p. 719), leading to significant inefficiencies and lack of transparency in assessment.

The response to these issues by the group of universities working on progress testing in the Netherlands, the MCC-AA in the UK, IMSm in Germany and the various collaborations in Australia (including AMAC) is to work together to build assessments or test items with a bottom-up approach. These collaborative approaches are purposefully in contrast to the directions taken in other jurisdictions such as the United States, where licensing exams are in effect imposed from the top-down on medical schools and students (Schuwirth 2007; Harden 2009).

Developing AMAC

In late December 2010, the Australian Learning and Teaching Council (ALTC) provided a grant to The University of Queensland along with the Australian Council for Educational Research (ACER) and Monash University to develop foundations for AMAC.

The project entitled “Developing the foundation for a national assessment of medical student learning outcomes” included scoping work, wide-ranging sector engagement, development of an assessment framework, the compilation of assessment items and the validation of items through pilot testing. This particular project, running until mid-2012, provided a foundation for what is the ongoing development and implementation of AMAC. A project website (www.acer.edu.au/amac) provides further information.

The core aims of this project were to achieve collaboration in the area of common assessment; develop the ability to benchmark outcomes across medical schools; and increase capacity of medical educators in development of quality assessments and assessment items – with a particular emphasis on learning outcomes towards the end of the medical degree.

Key facets of the project are detailed in this article, they are:

- Sector-wide engagement;
- Development of an assessment framework;
- Development of a pilot assessment;
- Implementation of a pilot assessment across a number of schools; and
- Dissemination of outcomes to students and schools.

Engagement

AMAC was initiated at a time of uncertainty in Australian higher education. As noted earlier, the government initiated Australian Medical Education Study highlighted some potential problems in the discipline and at the same time, the government was beginning to develop the national regulatory body known as TEQSA, and implement AHPRA and the National Registration and Accreditation Scheme. Among the group of academics and researchers who began the AMAC project, it was unknown as to the extent to which the medical education community would embrace a project aimed at examining outcomes and offering comparability through a common assessment. As such, the engagement aspect of AMAC's initial development was of key importance.

Formal engagement of medical educators, universities and stakeholders occurred through two forums organised by the project team. Both forums attracted widespread representation, with all Australian and New Zealand medical schools represented as well as attendance from a range of Australia stakeholders and interest from schools and governments from South East Asia. Over the course of the initial AMAC project, the conversations around these issues distinctly changed from “is this something we want?” to “how can we make this work best?”.

While the forums helped to build engagement in the project across the sector, other project activities also facilitated collaboration and engagement. Medical educators, leaders

and students were all involved in implementing the pilot assessment that was a vital part of the AMAC development. In this sense, engagement came through activities such as liaison with the project team in providing suitable items for the assessment, involvement in item revision and development workshops, organising the implementation of the pilot assessment within institutions, and for students, participation in the assessment and providing feedback to the project team.

Framework development

An assessment framework is fundamental to the development of robust and useful assessments (OECD 2009, 2012; Coates & Richardson 2011). The Assessment Framework developed for AMAC provides a structured conceptual understanding of the areas to be considered for assessment.

An assessment framework is similar to a curriculum framework, but more detailed such that it provides a robust roadmap of areas to assess. It does not specify what is to be taught or how to teach, rather, it specifies what is to be assessed. The AMAC framework articulates the learning outcomes to be attained by medical students after completing their regular medical training. It provides a structured conceptual understanding of the areas to be assessed and a reference system for assessment tasks to evaluate the coverage of assessment content. The framework provides substantive foundations for subsequent development, along with technical and practical considerations of what would be appropriate and feasible to assess (AMAC 2012).

The range of competencies expected of medical students by the time they reach graduation is substantial. These students need to be able to demonstrate basic competencies in professional practice, professional behaviour and communication. They also need to possess an integrated body of skills and knowledge.

The AMAC framework development was strongly informed by many national and international assessment frameworks and curriculum documents. The most notable of these are the Australian Curriculum Framework for Junior Doctors (CPMEC 2008); the 2009 Framework for Undergraduate Medical Education in the Netherlands (NFU 2009); the CanMEDS 2005 Physician Competency Framework (CanMEDS 2005); the Australian Medical Council Multiple Choice Examination Specifications Booklet (AMC 2011); and the Australian and New Zealand Medical Deans report, *Developing a Framework of Competencies for Medical Graduate Outcomes* (MDANZ 2011). It is informed by the processes and practices of the Tuning Project (Medicine) – Learning Outcomes/Competences for Undergraduate Medical Education in Europe (Cumming & Ross 2009); the AHELO project (OECD 2012); and the AHELO assessment frameworks (AHELO Consortium 2011a,b, 2012).

Broadly, this framework articulates the possible areas for an assessment instrument in medical education according to three dimensions:

- (i) Content Domains:
 - Medical Sciences and Practice, which consists of two sub-domains:
 - Clinical Problems and Conditions
 - Skills and Procedures

- Professional Practice, which consists of three sub-domains:
 - Communication
 - Clinical Management
 - Professionalism

- (ii) Process Domain:

- Clinical Competence, which consists of two sub-domains:
 - Cognitive Processes, which has two components:
 - Knowing
 - Understanding
 - Behavioural Processes, which has two components:
 - Demonstrating
 - Implementing

- (iii) Clinical Context

The development of the initial AMAC Assessment Framework took place over a period of 18 months of consultation with medical education experts, clinicians, stakeholders and students. While this core document has been created, further work and iterations continue as the project evolves.

Assessment development

Item collection and instrument construction of the AMAC pilot assessment was undertaken based on the Framework. Developing a pilot assessment was intended primarily as:

- a proof of concept for utilising the AMAC Framework;
- a means of informing item development processes;
- a conduit for testing the practical implementation of the assessment in medical schools; and
- a mechanism for trialling and developing the reporting of AMAC results.

The aim of the pilot assessment was to assess a few key areas of the Framework, rather than trying to cover the full spectrum which the Framework represents. In essence, assessing the full range of areas covered by the AMAC Framework is a task much greater than can be achieved in one single assessment. Building test items across the whole Framework is a long-term goal of AMAC.

The AMAC pilot assessment specifically focused on developing items in two sub-domains of the Assessment Framework: the Clinical Problems and Conditions sub-domain of the Medical Sciences and Practice content domain, and the Cognitive Process sub-domain.

The process of assessment item development began with a call to all medical schools in Australia and New Zealand to offer items from their existing assessments to the AMAC team for review, revision and possible incorporation into the AMAC Pilot Assessment. In total, 420 items were “donated” by nine different medical schools. Once items were received, members of the project team from ACER reviewed the items collected, mapped them to the Framework and then re-wrote and revised items to increase clarity and consistency. The items were then scrutinised by panels of item developers at ACER where they were further revised. The revised items were then

reviewed by medical clinicians from a range of different disciplines in two assessment revision workshops. During these workshops, items were accepted, revised or rejected. In total, 14 clinicians were involved in the workshops (seven at each workshop). The clinicians represented a wide range of medical disciplines including obstetrics, psychiatry, paediatrics, intensive care, surgery, general practice, gastroenterology and infectious diseases.

Following the workshops, remaining items were then mapped again to the Assessment Framework, and a core selection of items was made based on ensuring a spread across the sub-domains being assessed. The draft final selection was then reviewed by clinicians who participated in the workshops and an external consultant with expertise in medical assessment for coverage of the Framework and consistency.

A final 120 items were selected following these processes for inclusion in the AMAC pilot assessment. For testing, these items were grouped into six sets of 20 items. From these items and sets, six different test permutations of 100 items were created. This allowed for a number of different versions of the AMAC Assessment to be implemented and for the team to trial a greater number of items than were required for a single test sitting.

The final test versions were uploaded into online assessment software for secure online delivery, implemented by participating medical schools in Australia and New Zealand.

Assessment implementation

Two pilot implementations of the AMAC assessment were undertaken for the project. The first AMAC pilot, conducted in two medical schools, was undertaken in November 2011 and involved 49 student participants. The second involved seven medical schools and was conducted between April and June 2012, involving 464 participating students.

The first pilot was implemented to provide an early trial of the online delivery system and methods devised by the project team for administration of the AMAC assessment. It also provided some indicative statistics relating to the items in the test and, through a survey taken by students following the assessment, an early indication of the relevance of the content from the perspectives of the students participating.

The second pilot was run to gather more substantial data for psychometric evaluation of the items, to engage other medical schools in the administration of the assessment, to gather feedback from a large cohort of medical students in relation to the assessment and to provide some insight into the possibility of benchmarking through a common assessment.

Each institution participating in the pilot was supported by the AMAC team. Support came in the form of a detailed test administration manual as well as email and telephone support. The AMAC test administration manual included details on technical requirements (i.e. computer specifications, and details for test security), wording and information relating to the assessment that could be used in recruiting students, guidance on enabling students to log into the test system and a script for invigilators conducting the assessment. Each institution was supplied with unique student logins and passwords to access the test.

Once students had completed the test, all data were automatically sent to the ACER servers and stored securely. Institutions were asked to complete a short questionnaire following the test administration to ascertain any problems that may have occurred during testing and to maintain a record of the methods of test administration employed.

Dissemination of outcomes

A core facet of AMAC is to provide medical schools and students with a means for comparing their outcomes in a cross-institutional manner. In the piloting of the AMAC assessment and development of the implementation processes, two types of reports were drafted to assist in benchmarking and comparisons: an institutional-level report and a student-level report.

Student reports provided each participant with results grouped into a range of categories, with a benchmark result for each category based on all participating student's performance on the items. General information about the project was also provided to students as part of the reporting. This information included clear explanations of the data and highlighted a number of key caveats to interpretation and comparisons using the information at the pilot stage of AMAC.

Each participating medical school was also given a report detailing the outcomes of their cohort and providing some benchmark figures (again containing caveats about interpretation and comparison). Results for institutions were disaggregated by a number of student characteristics and offered schools an initial insight into the potential that AMAC could offer from a benchmarking perspective.

Outcomes

The main outcomes of AMAC discussed in this article come from the engagement of schools, the development of a framework, the implementation of a pilot test and the processes developed. While the pilot of the assessment provided data, the information offered through the data are indicative only and at best give an insight into the way in which future iterations of the assessment might be used. Results reported here are therefore intended to highlight the potential of AMAC rather than to offer absolute figures relating to student learning outcomes.

Overall, a total of 513 students from eight medical schools in Australia and New Zealand participated in the AMAC pilot. The numbers of students representing each school ranged from 13 to 124. Across the cohort of participating students, 88% were domestic students and 55% were female.

As an evaluative exercise following completion of the test, students were asked to indicate how relevant they found the AMAC assessment to their degree and to what they might expect to experience in their future profession. The responses of students were positive, with 82% of respondents indicating that they thought the content was "quite a bit" or "very much" relevant to their degree and 75% indicating this level of relevance to their future professional practice (Figure 1).

Students participating in the assessment achieved a mean score of 61 (out of 100), with a standard deviation

9. Reliability statistics show a 0.75 reliability for the pilot test. The distribution of scores across participating schools is displayed in Figure 2. These outcomes are not necessarily deemed representative of the full cohort of medical students from each school, the main purpose of this display is to highlight the potential that this data might provide in the future for offering a snapshot of student outcomes across schools.

Outcomes data in this case is generated across the whole test, but the AMAC assessment does have the potential for schools to explore their outcomes at more detailed levels and categories in the future. This potential within the development of AMAC is of particular note and one that is being further explored through the ongoing work of the collaboration. By expanding test items to broader areas of the framework and increasing items in certain domains, the aim

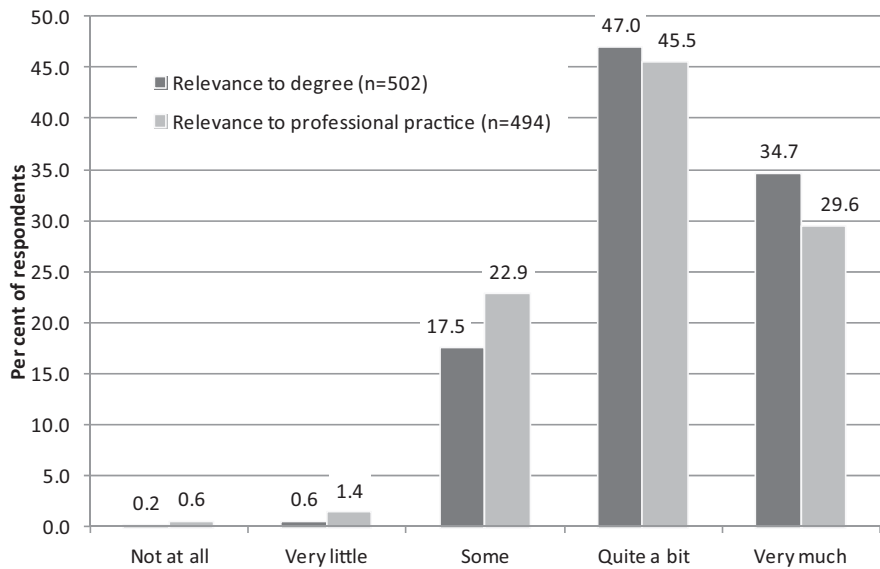


Figure 1. Relevance of AMAC pilot test to medical degree and to future professional practice – AMAC participant responses.

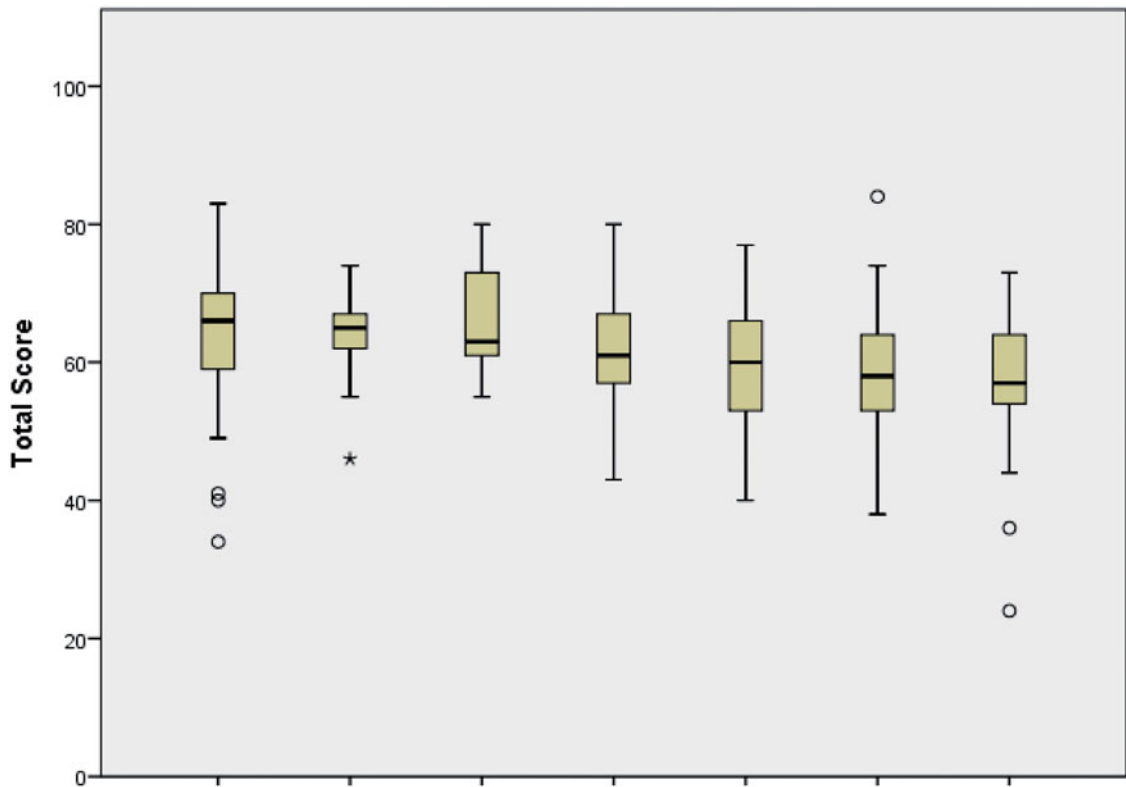


Figure 2. Distribution of AMAC pilot outcomes by school, 2012 pilot participants. The box plots display the interquartile range of the sample for each participating medical school. The small circles in the figure represent outliers (values that are between 1.5 and 3 times the interquartile range). The asterisk in the figure represents extreme values (values that are more than 3 times the interquartile range).

of the collaboration partners is to offer assessment tools that provide various benchmarking options enabling institutions to generate comparable outcomes data in order to further improving the quality of teaching and learning in medical education.

Lessons

AMAC offers an insight into the potential for development of assessment collaborations. The development outlined above offered a range of lessons to the project team and partners involved in this collaboration that could be of interest and use more widely across medical schools and in other disciplines in higher education. As such, this penultimate section of the article reviews the “building blocks” of this collaboration, and activities key to the AMAC development.

Building blocks of AMAC

In Figure 3, an overview of what the team considers as five key elements important to the establishment of AMAC are provided.

The first of these is a *committed group* – in the case of AMAC, this began with two medical schools and a research organisation. This initial group formed a vision and through the other building blocks (such as obtaining funding, engaging widely and developing “products”) has attracted a broader range of schools to the project team. *Funding* is another crucial facet that has aided the development of AMAC, with the team targeting government funding committed to projects aiming to improve learning and teaching. The resourcing this provided helped facilitate engagement forums and supported some key project staff to maintain project continuity. Implementation of pilot assessments within institutions and participation in workshops was all provided “in-kind” by participating medical schools.

As detailed earlier, *engagement* with the sector as a whole is seen by the project team as a key to establishing momentum for the project. The funding secured for this project also provided time and resources for the collaboration partners to develop *products* and resources – practical things that are able to display the commitment of the team and offer insight into its future vision. In this regard, the development of a framework and the implementation of a pilot test were critical. These things helped to legitimising the intentions of the collaboration and show that there was commitment to action and practical implementation. Finally, *ownership* by the medical education community is a key tenet of AMAC. Ownership is growing through a substantial widening of the project team to sixteen schools, but also through the ongoing inclusion and engagement of stakeholders.

Timelines

AMAC is an ongoing project and continues to evolve. However, the initial period of development and setting the foundations of AMAC, as outlined in this article, occurred over a relatively short period of time. The timeline for development from September 2010 to the beginning of 2013 is shown in Figure 4 to offer some further insight into the process of building this collaboration.

Conclusion

The collaboration built through this project has grown progressively, with an initial team in 2010 of two institutions and a non-profit research organisation, the AMAC collaboration embarked into its second phase of development in 2013 with 16 medical schools in the project team. As the collaboration grows, the lessons learnt from the initial development of the project offer insight into the opportunities that AMAC can provide into the future as well as guidelines for others in

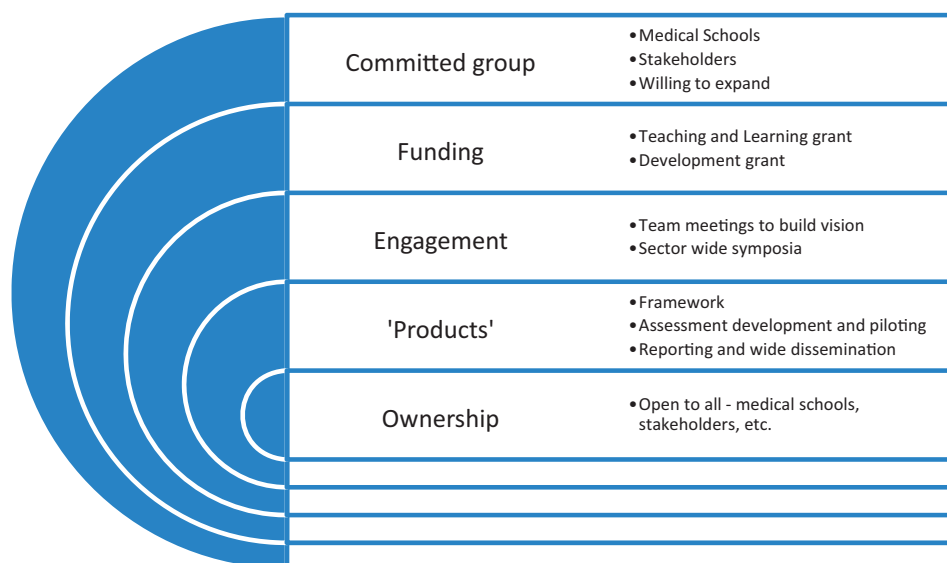


Figure 3. Building blocks for Assessment Collaboration – the case of AMAC.

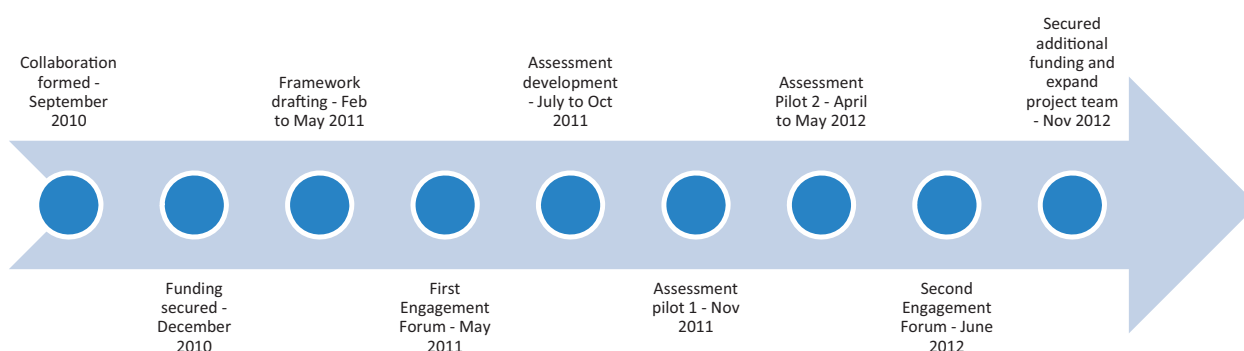


Figure 4. AMAC development timeline.

establishing assessment collaborations. Some key aims and outcomes for further development of AMAC include:

- Broadening the scope of items in the AMAC assessment to offer increased coverage of the assessment framework;
- Increasing the rigour of sampling student populations to enable more accurate benchmarking;
- Widening participation in assessment workshops as a means of improving items and developing skills in assessment writing across medical schools; and
- Development of formalised processes for item development/review and test administration as well as for overall governance.

The development of AMAC offers an example of how a group of medical schools can work together not only to create a basic metric for cross-institutional comparisons, but for improving assessment practices more generally. The collaboration aims to continue to nurture skills in assessment development across medical schools with the purpose of improving assessment practice and quality with an approach that yields positive outcomes for students, schools and society.

As focus grows on regulation and accountability in medicine and in higher education, the example of AMAC and the lessons learnt through its development provide insight into how harnessing assessment through collaborative efforts can offer a means of monitoring and ensuring quality while also developing an understanding of learning outcomes and assessment, and improving practices in education.

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Glossary

AMAC (Australian Medical Assessment Collaboration): A collaboration of medical schools, whose main focus is on the assessment of learning outcomes. Through their network they have developed an assessment framework, and piloted assessment items, which have been used by participating schools and students for benchmarking.
www.acer.edu.au/amac

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