SOUTH AFRICAN COMMITTEE OF MEDICAL DEANS

STANDARDISATION OF THE RESEARCH COMPONENT OF THE MASTER OF MEDICINE (MMED) DEGREE

FINAL RECOMMENDATIONS

Richard Hift MMed(Med) PhD FCP(SA) FRCP(UK)

Colleen Aldous PhD

12 September 2017

ACKNOWLEDGEMENTS

We wish to thank the many colleagues, including registrars and their representatives, who have engaged us in conversation and debate around the issues discussed in this paper. Their contributions have done much to assist us in clarifying our thinking.

We acknowledge the contribution of our colleagues who attended the SACOMD workshops held in Pretoria in February 2016 and Durban in June 2017. Their comments and suggestions assisted us in refining these recommendations. We our grateful to Professors Gert van Zyl and Diane Manning who served as rapporteurs and provided useful summaries of those meetings.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. Background

1.1. Candidates for medical specialist training in South Africa are registered by a university for the Master of Medicine (MMed) degree, which is categorised as a Professional Master's Degree in terms of the South African Higher Education Qualifications Sub-Framework (HEQSF).

1.2. A Professional Master's Degree requires that 25% of the credits are assigned to a research project. The. The Health Professions Council of South Africa (HPCSA) additionally mandates the performance of a research project as a prerequisite for registration as a specialist.

1.3. Since the inception of the HPCSA rule, there has been hitherto little uniformity across universities in terms of the total credits assigned to the MMed degree, the required scope, standard and credit weighting of the research component, and the provision of protected time for performance of research.

1.4. Accordingly, the South African Committee of Medical Deans (SACOMD) requested the authors to convene a process which might result in a set of uniform recommendations for the universities.

1.5. In the first draft of the current document, the authors proposed a set of principles around which the research component of the MMed degree might be constructed, and arising from these, made recommendations on the scope, time allocation, credit weighting and format of dissertation for this component. In doing so they drew on the insights and ideas generated at the first national workshop.

1.6. The provisional document was subsequently circulated to universities, tabled at the SACOMD meeting in November 2016 and was then discussed further at the second national workshop held in June 2017.

2. Purpose of the research requirement

2.1. Performance of a research project and production of a dissertation are not ends in themselves. The relevant yardstick is the research-relevant learning gained by the student.

2.2. The learning is both informative (knowledge and skills) and transformative. The objective is not only development of knowledge and skills, but also a change in understanding, attitude and modes of thinking and reasoning.

2.3. Supervisors and programme coordinators need to understand their role in ensuring that both informative and transformative learning occur. It is insufficient to restrict supervision to the direction of a series of sequential mechanical activities in the absence of transformative learning.

3. Learning outcomes

3.1. The learning outcomes are summarised in Table 3.

4. Suitable research projects

4.1. Research projects in categories such as cross-sectional studies, prospective observational studies, cohort studies, controlled trials (randomised and non-randomised) and most laboratory-based studies are suitable. Such projects place an emphasis on generation of a research question and hypothesis, and the identification of the appropriate aims, objectives and methodologies necessary to answer the question. Proficiency in this is critical to the successful practice of research.

4.2. Audits and systematic literature reviews should preferably be structured to require the generation of a research question, problem statement, hypothesis, aims, objectives and methods, rather than being purely descriptive, for the reason stated in the previous paragraph. They should require a protocol and a structured methodology (e.g. a systematic literature review or scoping review).

4.3. Case reports, informal literature reviews and audits not meeting these criteria are in general not suitable for the research project.

5. Impact of the project

5.1. The primary aim of the research component is the development of knowledge and skills relevant to research. Low-impact projects not suitable for publication in accredited journals are acceptable, provided that the dissertation shows evidence that the learning outcomes have been met.

5.2. Many MMed students can deliver work of sufficient impact to be published or otherwise used within a clinical setting provided they are properly supervised and assisted. Such high-impact projects should be encouraged wherever possible.

6. Format of presentation

6.1. We recommend presentation in the format of a short dissertation comprising:

- Prefatory material (Title pages, Declarations, Dedication, Acknowledgements, Table of Contents, List of Abbreviations, Abstract).
- An introductory chapter summarising the background to the project and containing an appropriate literature review.
- The research project written up as a publication-ready manuscript.
- Appendices, which should include the research protocol and evidence of the necessary ethics permission.

6.2. Preparation of the dissertation itself should not be unnecessarily onerous or time-consuming.

7. Notional hours

7.1. Up to 900 hours of activity are necessary for these learning outcomes to be met. These are summarised in Table 4.

7.2. This represents approximately 24 working weeks. From the practical standpoint, it would seem reasonable for this time to be made available to the student as 8-12 weeks of dedicated time (whether taken *en bloc* or distributed over the four years), with the remainder to be undertaken alongside other activities or during own time.

7.3. Adjustments will have to be made as programmes migrate to a five-year training period.

8. Credits

8.1. The complete research component should be assigned 90 credits, in line with 900 notional study hours.

8.2. We provide two alternative frameworks for the credit value of the entire programme. Which is accepted will require a national decision by the SACOMD.

1. Fifty percent of the total four-year experience of 7680 hours (48 weeks multiplied by four years) is assigned to academic activity (inclusive of work-integrated learning) and the remainder to pure service provision. This equates to approximately 360 credits. The 90 credits set aside for the research component therefore constitute 25% of a total of 360 credits for the MMed programme.

2. The second option is that the student is regarded as a part-time student, completing what is effectively a two-year professional Master's programme over four years. In this option the total number of credits is halved to 180 credits, and the research component to 45 credits.

9. Recognition of prior learning

9.1. Requests for recognition of prior learning by students who have completed a research project previously should be approached in terms of standard university regulations.

9.2. Where the previous project was performed as part of a Masters level degree, exemption and recognition of credits may be appropriate.

9.3. Where the previous project was not performed as part of a Masters level degree, the student is not eligible for credit and should therefore be required to register for the research modules.

9.4. Exemption from the research modules for students who already have a research background is not necessarily in the interests of either the student or the faculty, since such students are well placed to develop their own research career (preferably to PhD level) and are able to play a significant role in furthering the research agenda among their colleagues as a role model and a mentor.

10. Support for the Research component

10.1. It is critical that support structures are put in place to assist the large numbers of MMed students who are now subject to the requirement to perform the research component.

10.2. The major steps to be undertaken are identified as follows:

- Build an environment with a strong research ethos
- Nurture and support the research activities of the MMed students
- Enhance supervisor capacity
- Provide protected research time.

10.3. It is recommended that a minimum of 8 weeks is identified as dedicated research time during the training programme, with 12 weeks being preferable. Flexibility in implementation is essential.

10.4. This will require the understanding of the registrars' employers: the provincial health departments and National Health Laboratory Service.

1. INTRODUCTION

1.1. Background

The Master of Medicine (MMed) programmes offered by South African universities are Professional Master's programmes pursued by qualified medical practitioners wishing to train as medical specialists. MMed programmes extend over four years and have two components: clinical training, which occupies the bulk of the study period, and a research component.

The process of specialisation has, from the point of view of the student, three potential outcomes:

- Students stand to gain a fellowship from the Colleges of Medicine of South Africa (CMSA).
- Students become eligible for admission to the specialist register of the Health Professions Council of South Africa (HPCSA), where after they may practice as specialists.
- Students become eligible to graduate from the University with the MMed degree.

Two recent decisions by the HPCSA have had a major impact on the way the MMed programmes are implemented within medical schools. Firstly, the HPCSA has appointed the CMSA as the authorised provider of the qualifying examinations for registration as a specialist. In the interests of efficiency, the universities for practical purposes no longer set their own MMed examinations, but recognise the final Fellowship examinations offered by the CMSA in lieu of an internal examination process. Secondly, the HPCSA issued a ruling that, with effect from December 2015, completion of a "research component" during specialist training is a prerequisite for registration. It is desirable that the research project which falls within the MMed programme is designed such that it simultaneously satisfies the requirements of the HPCSA for specialist registration.

1.2. Problems with standardisation of the MMed programmes

The HPCSA directive

Beyond mandating a credit weighting of "60 credits", the HPCSA directive is not specific about the nature, standard or expected outcomes of the research component required for specialisation.

HEQSF requirements

In terms of the revised Higher Education Qualifications Sub-Framework (HEQSF), gazetted in October 2014, the MMed qualification is classified as a Professional McMaster's degree, a generic class of qualification for which several conditions are set. The minimum prescribed credits are 180, of which 120 credits must be at South African Qualifications Authority (SAQA)

level 9 (Table 1). It is required to include an independent study component comprising at least one quarter of the total credits. This may consist of either a single research or technical project or a series of smaller projects demonstrating innovation or professional expertise equivalent to SAQA level 9 (Table 2).

In comparison with other Masters programmes offered by universities, MMed programmes are anomalous in that they are spread over four rather than two years. There are no specific prescriptions within the HEQSF as to whether or how the research component should be scaled up to maintain a 25% weighting within these extended programs. Scaling this up would essentially mean that a full year of the four-year programme is devoted to the research component. This would appear neither desirable nor practical.

Competing priorities for time

It is recognised that there may already be insufficient time within the MMed programmes for students to master the clinical component of specialist training, giving the ever-expanding knowledge and skills required for modern specialist practice. Indeed, an increase in training from 4 to 5 years has already been mandated by the HPCSA for certain disciplines. Time devoted to the research component is effectively time removed from the clinical training component. It is essential that a balance is found which enables the purposes of the research component to be met while not jeopardizing the clinical competence of the graduating specialist.

Lack of uniformity

Given the lack of explicit direction from HPCSA and the HEQSF, there is wide variation across the universities in terms of their expectations of the research project, the format in which it is submitted for examination, the credits prescribed for it and the credits set for the entire programme.

1.3. The current process

Noting this lack of uniformity, the South African Committee of Medical Deans (SACOMD) convened a national workshop in February 2016 attended by representatives of the universities, HPCSA, CMSA and student representatives from the South African Registrars Association (SARA) to discuss this issue. The conclusion of the workshop was that the lack of clarity and resultant lack of uniformity are real and are undesirable. It was agreed that the authors would lead a process to address this.

Enquiry has shown that there are no specific regulations prescribing the scope, format and credit-weighting of the research component, other than the generic HEQSF rules governing Professional Master's programmes. Clause 14 of the Gazette in which the HEQSF is published specifically states: *The credit allocation for core, fundamental and elective learning will depend on the purpose of the programme or qualification. The internal organisation of programmes is otherwise not prescribed by this document*. There is therefore an opportunity for the universities to conceptualise the MMed research component in the most educationally appropriate manner and, if necessary, to formalise this within the HEQSF.

In drawing up the recommendations in this document, we therefore proceeded as follows.

1. Beginning from first principles, we attempted to define the actual purpose of the research component of the MMed degree.
2. Arising from this, we proceeded to:
   - determine the educational outcomes of the research component.
   - identify the appropriate size, format and complexity of the research project.
   - identify an appropriate format for the dissertation.
   - estimate the time required for the research component.
   - estimate the number of credits to be assigned to the MMed programme generally and the research component specifically.
3. This was produced as a draft document which was circulated to all Schools and tabled at a quarterly SACOMD meeting in November 2016.
4. It was subsequently discussed at a second workshop held in Durban in June 2017.
5. A definitive version of the recommendations was thereafter produced.

---

2. PURPOSE OF THE MMED RESEARCH COMPONENT

We believe that the purpose of the research component of the MMed is as follows:

1. To stimulate the interest of the student in research.
2. To allow students to become familiar with the knowledge and skills which underpin research.
3. To stimulate the critical thinking and high-order reasoning required of a level 9 qualification in terms of the HEQSF.
4. To promote scholarship within what is otherwise a technical vocational training programme.

---

3. INTENDED BENEFITS OF THE RESEARCH COMPONENT

3.1. Impact

We recognise that the research projects undertaken for the degree are likely to vary in terms of the impact of the work. We classify a *high-impact* project as one which merits submission to a peer-reviewed journal for possible publication. Such a submission should not only be of an adequate scientific standard, but will also have to meet the other expectations of a journal, such as novelty, impact and interest. In comparison, a *low-impact* project is unlikely to be accepted for publication in a journal. Its principal purpose is to provide the student with practical experience in the conduct of research.

High-impact projects

A high impact project may potentially have many beneficial outcomes for the student beyond the learning gained from it. It is publishable and may be of public benefit in terms of addition to knowledge. The student may be sufficiently inspired by this to undertake further research in future. Wherever possible, the most talented, ambitious and motivated students should be encouraged to aim for a high-impact project.

Low-impact projects

Though there may be some local benefit in terms of knowledge accruing to the clinical setting in which the work is performed, for practical purposes the only benefit of such a project resides in its educational value to the student.

3.2. Expected benefits of the research component

The expected benefits to the student are:

- An enhanced appreciation of the philosophy and methodology underlying the research on which clinical practice is based.
- A foundation of knowledge and skill on which further research participation may be built.
- Though there are some who aver that an understanding of research makes the practitioner a better clinician, we believe that this postulate must be viewed with caution.

High-impact projects have the following additional advantages:

- They may add to the universal store of knowledge for public benefit.
- They will contribute to national publication rates: critical given the serious decline in South African academic output at the turn of the last century.
- They may encourage the participants to consider undertaking further studies, and to prepare for a research-active academic clinical career.

Wherever possible potential recruits to academia should be steered into the high-impact route. The needs of this group should not however be confounded with those of most specialist trainees whose primary interest is in specialist clinical practice. Indeed, we recommend that universities develop specific programmes which prepare the more academically-inclined students for PhD programmes even as they undertake their specialist training.

---

4. LEARNING OUTCOMES FOR THE RESEARCH COMPONENT

We propose a number of learning outcomes for the research component, summarised in Table 3. As a general principle, learning outcomes should be stated in a manner which permits of assessment. In working through these outcomes, it becomes evident that though many of them may be assessed in the process of marking a thesis, there are other, broader outcomes which

require specific assessment. For example, a student cannot be assessed on their general understanding of statistical methods based on a thesis which may require only a very narrow subset of those methods, or even none at all. We believe that these therefore require independent assessment in written format.

Since one of our recommendations is that students register for a module which covers the background to research, research ethics and research methodology, this could profitably be assessed by a written assessment at the end of that module. We do not recommend incorporation of such assessment into the Fellowship exams of the CMSA. Firstly, it is agreed that research competence and its assessment remains the responsibility of the Universities. Secondly, the wide variation in assessment methods across the full spectrum of all the specialties, as well as practical issues of coordination of writing and marking, make this difficult.

The proposed outcomes are fully compatible with the SAQA level 9 descriptors listed in Table 2. Learning should be both *informative* and *transformative*. It is our impression that discussion of the MMed research component typically revolves around informative learning, in other words, facilitating the acquisition by the student of a body of research-appropriate knowledge and skills. The need for transformative learning is in most cases not explicitly addressed. We believe however that it is critical. In our opinion, the clinical scientist is not merely a clinician with a set of extra skills.

4.1. The place for transformative learning in the MMed research experience

Attitudinal change

Demystification: loss of fear and anxiety

The practice of clinical medicine and the practice of research are two very different domains. Clinicians with little research experience who embark on research find that they are moving from an area in which they are knowledgeable, confident and can hold their own in discussion—an area of low existential anxiety—to an area in which they are effectively novices. They may lack confidence, feel insecure and feel unable to participate meaningfully in professional discussion. They have thus moved into an area characterised by high levels of existential anxiety. The degree of discomfort and dislocation encountered in the transition should not be trivialised. One of the major outcomes of the MMed research experience should be a demystification of research, such that the student is comfortable with the practice of research thereafter.

Appreciation of the importance of research

Though all clinicians understand that progress in clinical medicine is founded upon research, they may not appreciate the importance of developing a substantial cohort of globally-competitive clinician-scientists in South Africa. This is critical if South Africa is to embrace the knowledge economy, as endorsed by Government. It is also important from the standpoint of finding local solutions for local problems. There has been a serious contraction in biomedical research output, particularly clinical research, by South Africans over the past 30 years. There is now a nationally agreed imperative for a major expansion of research and the production of

substantial numbers of research-active clinicians. The MMed research component has the capacity to play a critical role in this.

Enthusiasm for research

It is highly desirable that the graduate emerges from the research component with a respect and enthusiasm for research, such that he or she is likely to promote the research agenda in the future, whether by personal involvement or by support and understanding for the work of others.

Cognitive change

Expertise as a clinician versus expertise as a scientist

There is extensive evidence to support the view that expertise as a clinician and expertise as a scientist differ substantially in the way information is cognitively processed. Modern theory posits that expertise arises from possession of a large body of thoroughly understood, well-integrated knowledge based on long-standing experience, encapsulated in long-term memory as an extensive store of patterns and schemas. These are then drawn upon subconsciously in solving clinical problems; essentially a process of pattern-matching rather than logical analysis. Indeed, most diagnoses and clinical judgements result from a quick, automatic, subconscious and non-analytic reasoning process. The longer and deeper the experience, the greater the expertise (Simon and Chase's rule of "10 years or 10,000 hours"). Indeed, it has been shown that where the expert encounters a case with which he or she is not familiar, he or she must fall back on a conscious hypothesis-generating and deductive reasoning process. This has been shown to be a far slower and less accurate process than the subconscious intuitive recognition of the problem. Additionally, the difference in performance between the expert, and the less-skilled practitioner is greatly reduced under these circumstances. Yet ironically, this conscious analytic process is closer to the reasoning process valued in science.

Clinical practice is also highly empiric. Outcomes frequently differ from that which might be rationally predicted on the basis of theory, and the expert clinician learns to rely on a large body of personal experience of positive and negative outcomes, even where these may appear to conflict with rational explanation. Typically, decisions are made based on incomplete data, and assumptions must be made and included in the reasoning process.

The process of scientific research by contrast is highly analytic. It is based principally on the use of theory, hypothesis generation, observation and logical deduction in relating causes to outcomes, and logical inference, both inductive and abductive, in postulating explanations for observations. Incomplete data are largely unacceptable, assumptions completely so (unless explicitly acknowledged) and belief based on empiric experience inadmissible. Our own experience in guiding senior, experienced clinicians through doctoral studies has shown that the process of adjusting their way of thinking is often traumatic and resisted. The student needs to come to terms with the realisation that the highly intuitive cognitive processes based on knowledge, experience and acceptance of assumptions which characterise their clinical expertise are a serious obstacle to success as a scientist.

Therefore, if the MMed research project is to be of full value, the learning should be twofold: not only informative (factual and procedural knowledge about the components of research and the

mechanics of carrying it out), but also transformative. By the end of the process, the student should be a different individual, with a different set of values and comfortable with reasoning within a paradigm which differs from that which they are accustomed to using in clinical problem-solving.

Critical reasoning

A prime outcome of the research component should be an enhanced critical reasoning ability. It is essential that students can propose, follow and appraise a chain of logical arguments. They must be able to identify and avoid flaws in reasoning, and to distinguish assumptions and presumptions from established fact. They should be able to employ deductive, inductive and abductive logic in hypothesising the relationships between causal circumstances and observed outcomes.

Synthetic reasoning

A prime skill to be developed during the research component is that of synthetic reasoning. This is the ability to identify essential or potentially valuable informational components from multiple sources and synthesise them into a formulation where the whole is greater than the sum of the parts. This is a key ability to be developed in the literature review, introduction and discussion of the thesis. This ability is directly applicable to clinical medicine, particularly in the ability to draw inferences and patterns from multiple sources in the literature which may then be practically applied to clinical practice.

Shift from empirical problem-solving to problem-solving using the scientific method

It is essential that the student can identify and isolate personal beliefs and biases. Effective problem-solving in clinical practice frequently requires the clinician to act upon on intuition emerging from personal experience, even in the absence of evidence, since clinical situations are rarely directly comparable with those studied under scientifically rigorous conditions. However, this is not compatible with the scientific method. In our experience, clinically-trained students at both Master's and Doctoral level find it difficult to identify and isolate such biases. Much of their writing incorporates assumptions for which the evidence is not supplied or may not even be available. The student must therefore learn to reason and to write in a manner which is based on evidence whose quality has been assessed, and is devoid of all assumptions, except where these are overtly acknowledged.

Enquiry-led problem solving

This is the capacity to identify or recognise a situation which provides the opportunity for further study to answer a useful question, and then to frame that question in a rigorous manner which facilitates further study leading to an unambiguous finding. In our experience, it is not uncommon for students to arrive at the point of final write-up, only for it to become apparent that they themselves do not clearly understand just what the question is they have answered and how their data should be used and interpreted. This is often the result of attempting a research project cookbook-style, without the necessary understanding which accompanies transformative learning. Enquiry-led problem-solving is clearly essential to progress in the field of clinical

medicine, and many of the best clinician-scientists are those who can identify problems in the clinic and successfully translate these into research questions which they then subsequently answer.

4.2. The place for informative learning in the MMed research component

The full value of the research component will not be realised if a student's learning and experience are restricted to the knowledge required for his or her own project alone. This would be like attempting to learn medicine by studying just one patient. The project should rather serve as an opportunity to gain personal experience situated within a broader appreciation of and exposure to research practice. We recommend that students receive a formal programme of instruction designed to develop an understanding of research as a discipline in its own right. Suitable topics are listed in Table 3. It is also highly desirable that students are extensively exposed to the research projects of their fellows and of staff in order to develop a holistic view of the practice of research.

There are several skills that the student needs to master if they are to have basic research literacy.

Working with the literature

The student should be competent in accessing the literature, identifying and retrieving the most relevant material, and in synthesising a viewpoint based on the totality of literature. They should also have proficiency in the use of referencing software and the computerised storage and retrieval of their literature collection.

Formulating a research question

It is essential that the student can construct a concise, unambiguous and potentially answerable research question, formulate a problem statement and hypothesis, and translate this into appropriate aims and objectives. In our experience, this lies at the heart of the transformative learning which should accompany the research component.

Addressing ethics and writing a protocol

Research Ethics Committees at universities may have requirements for protocols that include the completion of a short course on ethics. Protocol writing may be the student's first introduction to appropriate referencing, and the use of referencing software.

Collecting and recording data

Students should receive practical instruction in the design of forms, questionnaires, data sheets, spreadsheets and databases suitable for data analysis.

Analysing data

This includes correct use of statistical methods, and the ability to extract trends and conclusions from data and to recognise inappropriate or unjustified conclusions based on incomplete data or inadequate samples. Students should be able to distinguish clearly between conclusions drawn from the observed data and conclusions based on prior or personal expectation.

Preparing a manuscript

This is an essential skill for both reading and presentation of research results.

---

5. APPROPRIATE PROJECTS FOR THE RESEARCH COMPONENT

It is essential that the chosen research project provide a vehicle for achieving as many of the outcomes described in Table 3 as possible. The project should require the formulation of a problem statement, research question, hypothesis, aims and objectives, since this ability is critical to research competence. In general, this would tend to exclude purely descriptive projects, such as single case reports, small-series audits and unstructured literature reviews as suitable projects. There is however a place for rigorous and highly structured literature reviews requiring a protocol and application of structured methods, for example a systematic literature review or scoping review. (Such reviews are highly intensive, time-consuming and require insight and mature judgement: they are more likely to be performed well by the more able student.)

In some cases, it may be possible to formulate literature reviews and audits in a manner which permits this higher-order conceptualisation of the project. For example, a systematic literature review formulated as *Does the literature support the use of immunotherapy in tuberculosis?* rather than *A systematic review of the use of immunotherapy in tuberculosis,* or an audit formulated as *Does age correlate with outcome in rapidly progressive glomerulonephritis: a study based on 30 patients treated at hospital XYZ* rather than *Rapidly progressive glomerulonephritis: The St Elsewhere's experience.* Formulation as a research question is more likely to stimulate the research-centred problem-solving skills of the student. Such a rule cannot however be rigid. We acknowledge that carefully-studied audits may constitute high-impact projects. We recommend however that descriptive formats are not accepted by default, and that those aspects of research competence related to formulation of a research question, hypothesis generation, determination of aims and objectives, design of an appropriate methodology and critical reasoning receive serious attention when projects are designed.

In general, cross-sectional studies, prospective observational studies (frequently case series), cohort studies, controlled trials (randomised and non-randomised) and most forms of laboratory-based research will adequately address the learning outcomes of the research component. Development of research databases to which students have access for the answering of specific research questions can facilitate the performance of projects.

6. FORMAT OF THE DISSERTATION

Publications in peer-reviewed journals constitute the currency of medical and scientific research. The ability to present research work in publication format is itself a critical skill for the researcher. Requiring the student to present their work as a publication-ready manuscript rather than as the conventional thesis has many advantages. An expanded literature review is helpful, since proficiency in accessing the literature and in synthetic reasoning underlies both successful research and clinical practice. We suggest that preparation of the dissertation should be neither complex nor excessively time-consuming. Though some Universities may allow the term “mini-dissertation”, it is not part of the lexicon at others and the term should not be used outside these institutions.

The following format appears generally acceptable. The work is presented as a short thesis structured as follows:

Preface

- Title, Declaration of Authorship, Supervisor’s approval, Dedication, Acknowledgements, Table of contents, Abbreviations, Abstract.

Chapter 1

- A critical and synthetic literature review placing the research project in perspective.
- Statement of the following: Research Question, Aims, Objectives, Hypotheses.

Chapter 2

- The candidate’s research project written up in publication-ready format.

Appendices

- The original research protocol as submitted to Ethics, correspondence with Ethics Committee and letter of approval.
- Any other relevant material.

7. NOTIONAL HOURS AND CREDITS

7.1. Estimation of notional hours required for the research component

We have estimated the notional hours which might be required for the typical student to undertake the necessary informative learning, perform the project from conception to completion and spend sufficient time on the whole enterprise for the transformative learning to be realised. Whereas an experienced researcher may require a few hours to complete a research-related task, the student may require much more time. This is not just the result of inefficiency arising

from inexperience, but is also a direct function of the extra time required for deep learning. Deep learning will necessitate exploration, discovery, experimentation, trial and error, consultation with colleagues, supervisors and librarians, the study of web resources and written material to facilitate an understanding of research methodology and the development of specific skills, such as the use of referencing and statistics software packages. Where this time is denied (or not utilised by the student), the outcome is a cookbook project, where the student carries out the work as instructed by a supervisor, with little understanding or learning.

Table 4 summarises our estimate of the number of hours necessary for each step of the research component to be addressed. We have allowed a further 50% for *enabling activities*; principally activities which underlie the deep learning discussed in the previous paragraph. This empirical estimate suggests that assigning 900 notional hours, equivalent to 90 credits, to the research component may be necessary for the student to develop the knowledge and skills and undergo the necessary attitudinal and cognitive transformation to achieve the outcomes required of the research component, and to produce a dissertation which reflects their achievement. We note that there is educational value in spreading research activities across all four years to promote a deeper and more meaningful engagement with research learning.

7.2. Determining credits for the programme

We have benchmarked these 900 hours against several other factors to assess whether our estimate is likely to be practical and appropriate. We have worked based on a four-year MMed programme throughout: extending this to 5 years results in some additional complications that will have to be addressed in due course. We have identified two alternative frameworks for the MMed programme.

Option 1. Full-time study

Set the research credits at 90, and the total program credits at 360. The reasoning is as follows.

1. The estimated 900 hours are the equivalent of 24 working weeks.

2. **Assumption 1**. If 50% of this is done within the normal “clinical” working week or outside working hours, the resulting 12 weeks’ dedicated time is in line with intuitive estimates of the time that can and should be devoted to the research project by many of the academics with whom we have interacted.

3. **Assumption 2**. A four-year full-time programme comprising 48 weeks for each of four years totals 7680 hours. If we assume that 50% of this is academic time and 50% pure service time, then the academic component is 3840 notional hours, equivalent to 384 credits.

4. A total credit weighting of 384 credits is just over double the 180 minimum credits prescribed for a professional Master’s programme by the HEQSF. Since these minimum credits will in most cases applied to two-year Master’s programmes, assigning double these credits to a four-year programme seems proportionate.

5. A 90-credit research module then constitutes 23% of the total 384 credits, which is in line with the 25% research component required of a professional Master's programme.

6. In this framework, the MMed programme is designed as follows:

    - Total working hours (exclusive of overtime) 7680
    - Academic component hours 3600 (50% of 4-year programme)
    - Credits for MMed programme 360
    - Research component 90 (25%)
    - Clinical learning component 270 (75%)

Option 2. Part-time study

1. The student is assumed to be a part-time student, reflecting their obligation to perform clinical service, not all of which constitutes in-service training. By this reasoning, they complete a 2-year Professional Masters programme over 4 years.

2. The above hours are therefore halved:

    - Total working hours (exclusive of overtime) 7680
    - Academic component hours 1800 (25% of 4-year programme)
    - Credits for MMed programme 180
    - Research component 45 (25%)
    - Clinical learning component 135 (75%)

3. These 180 credits meet the minimum credits prescribed for a professional Master's degree (180) set by CHE.

4. Regarding the student as part-time and reducing the credit load to the minimum may have subsidy implications, which require investigation.

5. Halving the credits and notional hours attached to the research component will result in a substantial downscaling of both expectation and experience.

6. That the MMed may require special consideration is provided for in Appendix 1 of the Government Gazette in which the HEQSF is promulgated. The third paragraph reads as follows:

    Master's Degrees in Health Sciences: In certain professions in the Health Sciences (Medicine, Chiropractic, Homeopathy) a specific type of Master's degree is required for registration as a professional (e.g. the MMed, MMedVet and MDent), that has a credit load far more than the indicative 180 credits that the HEQSF requires for a Master's degree, with credits spread across various NQF levels. While such qualifications will continue to be classified together with the Master's Degree, consideration will be given to the formal time and levels of funding that is appropriate for these programme types.

Rejected alternatives

1. We do not recommend increasing the research component beyond 900 hours/90 credits. We believe that this would be excessive and will detract unnecessarily from the time needed for clinical learning.

2. We do not recommend inflating the credit value of the research component to artificially constitute 25% of a large credit load such as a total of 720. (In at least some universities, the current credit weighting of the research component far exceeds that for which students receive the time and learning opportunities.) This requires a serious misrepresentation of the actual design of the programme. To do so is likely to result in ongoing confusion as to the scope of the research component, and may give rise to concern on the part of students that they are not receiving what they are due.

3. Nor do we recommend reduction of the research component to less than 900 hours/90 credits. This would permit simpler projects and allow more time for clinical learning.

    - Reducing the research component below 90 credits in a 360 credit programme implies a reduction below 25%. This would require formalisation with CHE as an exception.

    - A reduction to 45 credits as part of a 180-credit part-time programme would be acceptable in terms of the NQSF. It will however substantially reduce the quality of the research-related learning, given the reduced exposure (particularly to learning and experience outside the narrow confines of the student's own project) and reduced time for the transformative aspects of learning. It is clear from the regulations governing Level 9 Master's qualifications, including the professional Master's degree, that a *substantial* investment in the research component, requiring a high level of intellectual engagement, was intended.

7.3. Recognition of prior learning for previously completed research.

Several students have requested exemption from the research component because they have already performed a research project, either for degree purposes (such as a previous MSc or MPH), or because they have previously participated in a research project which led to publication. We recommend that such requests are evaluated and a decision taken based on individual merit and within the context of the relevant University's rules regarding recognition of prior learning. The following are the generic rules applied at the University of KwaZulu-Natal to regulate exemption: it is likely that the rules applied at other universities are essentially similar:

GR8 Exemption from a module

a) Exemption from a module may be granted *without credit,* where an applicant can demonstrate an equivalent level of competence through prior learning. (Our emphasis).

b) Exemption and credit for a module may be granted where an applicant has already obtained credit for an equivalent module at this or another university.

Practical application of these rules would result in the following decisions, which are, in our opinion, appropriate and reasonable:

The student who has already produced a research project at Masters level.

In terms of GR8(b) or its equivalent at other universities, such a student may be exempt from the research component provided that the work was "equivalent" to that set out for the MMed research modules, *including any formal learning, coursework and assessment set out for the research modules*: not just the project itself. (Where an MMed program is structured such that the research methodology course and the research project fall within separate modules, it would be possible to exempt the student from one, the other or both depending on the nature of their prior work.)

Research work produced at Honours or Bachelor's level would not qualify for exemption, the degree being at a lower level.

The student who has participated in research, though not for a formal degree.

In terms of GR8(a) or its equivalent at other universities, such a student may be "exempt" from the module, *but would not receive credit for it*. This effectively means that they would indeed have to participate in the research module to gain the necessary credits. We believe this is reasonable, since research performed in the process of obtaining a degree is viewed, in terms of its educational potential, differently from research performed for the sake of research alone. This is discussed in more detail in the final paragraphs of this section.

General factors to be considered in allowing exemption

Though a student may qualify for exemption in terms of the rules, there are potentially adverse consequences to this.

Students who already have research experience should be a valuable addition to the general MMed student body. They should be able to participate in research discussions at a higher level, can potentially motivate their fellow students, will add to the research capacity of a discipline and should ideally be continuing with a research programme, possibly up to doctoral level. *Exempting such students from participating in research* (as opposed to merely exempting them from the research modules for credit purposes) represents a *lost opportunity* for both the student and the programme.

Increasingly medical officers, including community service medical officers, are coming forward requesting that they begin (or even complete) their research projects before entering a registrar programme and registering for the MMed degree. If this is done informally, then in terms of rule GR8(a) or its equivalent at other universities, *they would not receive the credits necessary* to graduate with the MMed. Current practice at UKZN is to register such students for the Master of Medical Science (MMedSc) degree. If this has not been completed before they enter the registrar programme, then they convert the registration from MMedSc to MMed. This qualifies them for exemption for any work which may have already been completed; alternatively, they may transfer their research project into the MMed and complete it there. Requiring prior registration to commence the research project has several important advantages:

- Students undertake their project under the supervision and protection of the University.
- They are required to follow the same processes of project and ethics approval as the MMed students.
- The project may be undertaken with the same degree of supervision and expectation of standard as the MMed project.
- Such prior work clearly qualifies for exemption from the MMed research module in terms of rule GR8(b) or its equivalent at other universities.
- Supervisors and University are eligible for the same recognition for the research work of the student as they would were the student to perform that work within the MMed program.

We believe such an approach is appropriate. In view of the many benefits expected to flow from the introduction of the research component into the specialist training programme, it is important that, however exemption is handled, it does not perpetuate the destructive belief that the research component is a distraction from training to be got out the way as soon as possible, rather than an integral part of the registrar experience.

Where students have been exempt from the research modules and elect not to continue with a research project, they should not benefit from such entitlements as dedicated research time.

8. SUPPORT FOR THE RESEARCH COMPONENT

A major factor repeatedly identified by the workshops, the student body and the HPCSA, is the need for the institution of robust support mechanisms to enable students to complete their projects at the required level. It is recognised that it will take time to produce a fully supportive environment. Pending this, appropriate transitional arrangements should be made. An important insight which came out the two workshops is that in most instances, arrangements for the support of students are *ad hoc*, and often vary greatly between disciplines even within a single school. Departments with a strong research capacity (often the larger departments) are able to provide better support for their students than those with a lesser capacity. It is essential that every MMed student has access to the same degree of support and assistance irrespective of discipline.

8.1. Build an environment with a strong research ethos

If South African medical research is to regain lost ground and be internationally competitive, it is essential that all our academic disciplines are committed to promoting research within their field. By forefronting research and the necessity for research, our disciplines will in time become populated with capable academics who are research-productive as well as clinically competent and active in teaching. Making research central to academic life will also promote the understanding that the research is a natural and important component in the development of a specialist, and will counteract the tendency, still encountered, to regard the research component as an unnecessary and therefore undervalued addition to training.

An essential component of this research ethos is frequent attendance at and exposure to research-centred meetings, seminars and symposia; not just clinical meetings in which the practical application of studies reported in the literature may be discussed (first-hand rather than second-hand research). It is critical that research is seen as a cross-disciplinary undertaking, spanning the basic and clinical sciences, the health professions and the specialist disciplines. Thus the research component of the MMed program may be of value in breaking down disciplinary boundaries, rather than reinforcing them.

8.2. Nurture and support the research activities of the MMed students

Institution or expansion of the following activities is likely to encourage students to complete the research component satisfactorily, and to encourage students to produce quality work.

- Formal orientation programs for new students
- Research mentoring
- Institutional support, including financial support for projects.

8.3. Enhance supervisor capacity

The lack of appropriately trained supervisors has emerged as a critical limiting factor in developing the research component within MMed programs. It is important that all schools work

to increase the staff available who have not only the appropriate research credentials, but also the insights and skills necessary to supervise, *including those necessary to bring about the transformative learning described earlier in this document.* This requires a significant increase in the number of academic clinicians holding doctoral degrees. One highly relevant consequence will be a greatly enhanced capacity for research supervision at Master's and doctoral level. Steps which may be undertaken to enhance supervisor capacity include:

- Increasing the academic expectations of academic staff in faculties, including masters and doctoral degrees
- Co-supervision, where inexperienced supervisors are teamed with experienced colleagues.
- Mentorship for emerging academics
- Training, accreditation & credentialing for research supervisors
- Use of supervisors outside disciplinary boundaries, including basic scientists & public health faculty
- Accountability for student throughput on the part of staff
- Recognition & rewards for those who supervise students successfully
- Collaboration between universities.

8.4. Provide protected research time

There is consensus that MMed students require dedicated time to complete the research component. In Section 7 and Table 4, we motivated the case for 900 hours of research distributed over the 4-5 years of training, of which up to half (8-12 weeks) should represent dedicated research time, a substantial proportion of which should be made available as a dedicated research block (taken together or as a series of smaller blocks) where the student is freed from clinical responsibilities other than those after-hours duties necessary to maintain emergency services and guarantee the registrar that proportion of their income. It is likely that there is no single blueprint for this which is appropriate for every discipline and every faculty. Flexibility is appropriate provided all students ultimately receive the same benefits.

Formalisation of research time will require the appropriate agreements with the employers (Provincial Health Departments and National Health Laboratory Service). National bodies, including National Department of Health, Department of Higher Education and Training, Council for Higher Education and HPCSA can play an important enabling role by ensuring that arrangements made with the employers are such as to permit the required credits to be obtained in the research to be performed to a level which satisfies the NQSF criteria. It may require adjustment of posts to ensure that the research component is adequately supported without prejudice to clinical service.

TABLE 1

HEQSF REGULATIONS FOR A PROFESSIONAL MASTERS DEGREE

Sourced from *http://www.che.ac.za/media_and_publications/legislation/government-gazette-higher-education-qualifications-sub-framewor-0*

Master's Degree (Professional)

Type specifications

NQF Exit Level 9
Minimum total credits: 180
Minimum credits at Level 9: 120

Designators

The designators for the professional Master's Degree describe the broad field of the programme, just as for the general Master's. However, the designator may be modified to indicate the professional orientation of the programme which can be further specified by a qualifier. Examples include Master *of Health Sciences*, Master of *Applied Science*, Master of *Applied Arts*.

Qualifiers

Specific, maximum one.

The qualifier indicates the professional orientation of the programme. Examples include Master of Applied Commerce in Taxation, Master of Education in School Leadership, Master of Medicine in Paediatric Surgery.

Abbreviations

MAppCom (Taxation), MEd (School Leadership), MMed (Paediatric Surgery)

Purpose and characteristics

The primary purposes of a professional Master's Degree are to educate and train graduates who can contribute to the development of knowledge at an advanced level such that they are prepared for advanced and specialised professional employment.

In some cases, a professional Master's degree may be designed in consultation with a professional body or fulfil all or part of the requirements for professional registration or recognition, and may include appropriate forms of work-integrated learning.

The requirements for the successful completion of the professional Master's Degree are as follows:

Successful completion of a coursework programme requiring a high level of theoretical engagement and intellectual independence as well as demonstration of the ability to relate knowledge to the resolution of complex problems in appropriate areas of professional practice.

In addition, a professional Master's degree must include an independent study component that comprises at least a quarter of the credits at NQF level 9, consisting of either a single research or technical project or a series of smaller projects demonstrating innovation or professional expertise.

Master's graduates must be able to deal with complex issues both systematically and creatively, design and critically appraise analytical writing, make sound judgements using data and information at their disposal and communicate their conclusions clearly to specialist and non-specialist audiences, demonstrate self-direction and originality in tackling and solving problems, act autonomously in planning and implementing tasks with a professional orientation, and continue to advance their knowledge, understanding and skills relevant to a particular profession.

Minimum admission requirements

The minimum admission requirement is a relevant Bachelor Honours Degree or a Postgraduate Diploma. A cognate Bachelor's Degree at Level 8 may also be recognised as meeting the minimum entry requirement to a cognate Master's Degree programme.

Progression

Completion of a Master's Degree meets the minimum entry requirement for admission to a cognate Doctoral Degree, usually in the area of specialisation in the Master's Degree. A qualification may not be awarded for early exit from a Master's Degree.

TABLE 2

INTELLECTUAL COMPETENCIES EXPECTED OF A SUCCESSFUL GRADUATE AT SAQA LEVEL 9 (MASTER'S DEGREE).

Sourced from South African Qualifications Authority:
http://www.saqa.org.za/docs/pol/2014/level_descriptors.pdf

Scope of knowledge	• Specialist knowledge to enable engagement with and critique of current research or practices • Advanced scholarship or research in a particular field, discipline or practice.
Knowledge literacy	• The ability to evaluate current processes of knowledge production • The ability to choose an appropriate process of enquiry for the area of study or practice.
Method and procedure	• A command of and the ability to design, select and apply appropriate and creative methods, techniques, processes or technologies to complex practical and theoretical problems.
Problem solving	• The ability to use a wide range of specialised skills in identifying, conceptualising, designing and implementing methods of enquiry to address complex and challenging problems within a field, discipline or practice • An understanding of the consequences of any solutions or insights generated within a specialised context.
Ethics and professional practice	• The ability to make autonomous ethical decisions which affect knowledge production, or complex organisational or professional issues • The ability to critically contribute to the development of ethical standards in a specific context.
Accessing, processing and managing information	• The ability to design and implement a strategy for the processing and management of information, in order to conduct a comprehensive review of leading and current research in an area of specialisation to produce significant insights.
Producing and communicating information	• The ability to use the resources of academic and professional or occupational discourses to communicate and defend substantial ideas that are the products of research or development in an area of specialisation • The ability to use a range of advanced and specialised skills and discourses appropriate to a field, discipline or practice, to communicate with a range of audiences with different levels of knowledge or expertise.

Context and systems	• The ability to make interventions at an appropriate level within a system, based on an understanding of hierarchical relations within the system • The ability to address the intended and unintended consequences of interventions.
Management of learning	• The ability to develop his or her own learning strategies, which sustain independent learning and academic or professional development • The ability to interact effectively within the learning or professional group as a means of enhancing learning.
Accountability	• The ability to operate independently and take full responsibility for his or her own work • Where appropriate, the ability to account for leading and initiating processes and implementing systems, ensuring good resource management and governance practices.

TABLE 3

LEARNING OUTCOMES FOR THE RESEARCH COMPONENT

OUTCOME	HOW ASSESSED
INFORMATIVE	
Knowledge	
Positioning of medical research within the South African context	Written assessment
The scientific method	Written assessment
Scientific reasoning	Written assessment
Research ethics	Written assessment
Levels of evidence	Written assessment
Research design	Written assessment
Methods of data analysis	Written assessment
Principles of statistics	Written assessment
Logical reasoning and bias	Written assessment
Skills	
Reading the literature	Thesis
Reviewing the literature analytically and synthetically	Thesis
Formulating a research question, aims and objectives	Thesis
Writing a protocol	Thesis
Addressing ethics	Thesis
Collecting and recording data	Thesis and written assessment
Analysing data	Thesis and written assessment
Preparing a manuscript	Thesis
TRANSFORMATIVE	
Critical reasoning	Thesis and Supervisor's report
Synthetic reasoning	Thesis and Supervisor's report
Scientific thinking/problem solving	Thesis and Supervisor's report
Enquiry-led problem solving	Thesis and Supervisor's report

TABLE 4

ESTIMATION OF NOTIONAL HOURS AND CREDITS REQUIRED FOR SATISFACTORY ATTAINMENT OF THE LEARNING OUTCOMES FOR THE RESEARCH REQUIREMENT

The third column is for contextualisation. It represents the "full working day equivalents" of the hours reflected in the second column, assuming all those hours were spread across sequential uninterrupted eight-hour working days. (It is not meant as a recommendation that this is indeed how the hours should be utilised by the student.)

Activity	Hours	Full working day equivalents
Formal teaching on principles and practice of research	50	6
Group work and exposure to the research of others	30	4
Preparing for protocol	80	10
Writing protocol	40	5
Collecting data	110	14
Preparing data for analysis	40	58
Analysing data	90	11
Writing up	110	14
Remaining current with the literature underlying the project	40	5
SUBTOTAL	**600**	**75**
Self-directed learning (50%)	300	38
TOTAL	**900**	**113**
Working week equivalents		23
Credits	**90**	