Development of Socially Responsive Competency Frameworks for Ophthalmic Technicians and Optometrists in Mozambique

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Title

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Background

There is an extreme paucity of eye care personnel and training facilities in developing countries. This study was designed to develop a comprehensive framework of competency standards for ophthalmic technicians and optometrists, in Mozambique. This could then inform the evolution of socially responsive curricula for both cadres.

Methods

A modified Delphi technique was used with a tenmember expert panel consisting of optometrists, ophthalmic technicians and ophthalmologists, all with experience of working in a developing country context. The competencies were derived from literature, primary research data and observations from a competency development workshop. The first round involved scoring the relevance of two frameworks, one for each cadre, using a 9-point Likert scale with a free-text option to modify any competency or suggest additional competencies. The revised frameworks were subjected to a second round of scoring and free-text comment. The final versions of the frameworks agreed were sent out to the relevant stakeholders.

Results

There was a 100% response to round 1 and an 89% response to round 2. The final versions of the competency frameworks contained six competencies, 20 elements and 88 performance criteria for optometry, and six competencies, 17 elements and 61 performance criteria for ophthalmic technicians.

Conclusions

Application of a consensus methodology consisting of a modified Delphi technique with primary research data allowed the development of competency frameworks for ophthalmic technicians and optometrists. This will help to shape the development of curricula for both

cadres, and potentially could be replicated in other regions that wish to develop socially

responsive education for eye care professionals.

Africa is characterised by an extreme paucity of eye care personnel and facilities.[1] VISION 2020 targets suggest each country should aim to achieve a ratio of one eye care personnel who can perform refractions per 50,000 people by 2020.[2] In Mozambique, there are currently17 Ophthalmologists, 120 qualified Ophthalmic Technicians (OT) and fifteen optometrists to serve a population of over 25 million.[3,4]

The development of competency- based education for mid- level eye care personnel (MLEP) has been identified as an important component in the solution to avoidable blindness and vision impairment.[5] Three concepts of understanding competence are: (a) behavioural approach that describe performance; (b) generic attributes essential to effective performance; and (c) holistic approach that combine a range of general attributes such as knowledge, skills and attitudes appropriate for professional practice.[6] This integrated and holistic approach aligns with the definition of competence provided by the General Optical Council in the UK: "Competence has been defined as the ability to perform the responsibilities required of professionals to the standards necessary for safe and effective practice. A competency will be a combination of the specification and application of a knowledge or skill within the occupation, to the appropriate standard".[7]

Many health care training programs such as ophthalmology[8] and optometry,[9] now base their curricula on the legal scope of practice and competencies. Provision of eye care requires the ability to apply skills and knowledge in practice. The advantages of a competency based education for eye care are substantial, especially in low-income countries where the need is greatest.[5] The development of competency frameworks for eye care has been emphasised as a key component of the human resource strategy to address vision impairment in Africa.[10]

The social responsiveness of medical schools has received increased emphasis as the first step towards social accountability.[11] It is defined as a capability by which an educational

establishment responds to societal needs and acts proactively to meet those needs.[12] The WHO has defined the social accountability of medical schools as having the obligation to direct their education, research, and service activities towards addressing the priority health concerns of the community, the region, or nation they have a mandate to serve.[13] The visual impairment statistics, critical shortage of human resources and gross inequities among different sectors of the population in sub-Saharan Africa has prompted eye care institutions to underpin their curricula in a framework of social responsiveness.[14]

Ophthalmic Technicians (OT) provide the bulk of primary eye care services (including refraction) in Mozambique. Past evaluations of their refraction skills had demonstrated that the current OT 18- month course with an 80 hour refraction component is insufficient to develop competence in anything apart from managing presbyopia.[15] Their competencies were affected by inadequate levels of training at different institutions, work experience and their location of work in reference to clinical load and support structures available.[15] They needed up-skilling to make them competent in performing retinoscopy and correcting astigmatism.[15] Due to the context of limited eye care and differences in training programmes for the OTs, there is an urgent need for standardisation in training and accreditation. The study supported the need to develop a competency framework to inform the design of new curricula and upskill existing OTs.

For the optometrists at the optometry school in Unilúrio their four year course was based on a curriculum developed by the Brien Holden Vision Institute with competencies from the optometry courses of the Dublin Institute of Technology, University of KwaZulu-Natal and the global competency-based framework of the World Council of Optometry (WCO). [7,16] Evaluations were carried out on the refraction competencies of the optometry students using

the WCO framework. Semi-structured interviews with the course lecturers and a course evaluation questionnaire for the students were used to identify factors affecting the students' academic performance.[17]It was recognised that a framework originating in one context in which competencies can be achieved, had to be adapted to better address the eye care and refraction need in Mozambique based on the local circumstances. The necessity to adapt the existing framework arises because of the need to pay attention to existing healthcare contexts including eye health conditions and patient role in and experience of healthcare; the role of traditional medicine; the availability and standards of equipment, and availability of, or lack of support from, other eye care personnel.

The overall aim was to develop, using a Delphi methodology, comprehensive frameworks of socially responsive competencies for OTs and optometrists. This in turn would inform the evolution of curricula for both cadres in Mozambique.

Methods

The Delphi technique has been previously applied to the development of competency frameworks and curricula for optometry and medical sub specialities.[18,19] The classical Delphi method is characterised by four key features: anonymity of Delphi participants, iteration, controlled feedback and statistical aggregation of group response.[20] A modified technique, whereby a draft document of competencies was generated using literature review, observations and primary research data rather than from an initial round of the Delphi technique, was used in order to reduce the number of rounds in our study. A diagram demonstrating the modified Delphi technique is presented in Figure 1.

Insert Figure 1 here.

Steps 1, 2 and 3) Information was gathered from an extensive literature review of existing education models for optometrists and MLEP, principles and elements of social responsiveness, and eye and health care needs in the region. This information was collated with observations from a competency development workshop organised by the College of Ophthalmology of East, Southern and Central Africa (COECSA) and primary research data, collected from the refraction evaluations of the OTs and optometrists.[15,17]

The first document of the Mozambique- specific refraction competencies was drafted using the information garnered from the steps above by the researcher and reviewed and approved by two faculty members who had experience with the Delphi technique. The development of competencies for this framework was based on Mark Albanese's five theory-based criteria for educational competencies.[21]

Based on the WCO Global Competency Model, the draft framework contained a hierarchy of steps identifying core competencies.[16] These included units of competencies, elements and performance criteria. The draft framework consisted of scales for quantitative statistical analysis and comment boxes for qualitative data collection. Participants used a 9-point Likert scale (*0* = not essential, *9* = essential) to rate the importance of each element and performance criteria (Table 1) with a free-text option to modify or suggest additional competencies and performance criteria. Data were entered in an Excel spreadsheet.

Step 4) A framework development stage was conducted with the primary objective to complete the draft framework and to grade the performance criteria of one set of competencies for the OT and optometrist cadres within the context of a low-resource environment and the legislative constraint of the length of their courses. The development

panel included three optometrists and an ophthalmologist (two males and two females). Three had worked in training optometrists and/or OTs in Mozambique. Two had experience in working with developing competency based curricula, one for the optometrists at Unilúrio, the other for the OTs at the IHS. Their mean (standard deviation) number of years in teaching was 9 (7) and in clinical practice was 11 (6.3). The framework development participants were excluded from the full-panel study. The participants were also asked to provide clarity to the instrument by identifying any incongruence or vagueness that might hinder interpretation of the framework, and identify required corrections to the proposed competencies.

Step 5) For this study a convenience sampling technique was used to provide perspectives from optometrists, MLEP and ophthalmologists involved in academia, experts working in public health and social responsiveness, and the training of MLEP and optometrists in a developing world context. Research participants were selected on the basis of their expertise, including knowledge and experience of the issues under investigation, familiarity with the local context in Africa especially Mozambique and their capacity and willingness to participate. The various stakeholders (course coordinators from Unilúrio for the training of the optometrists and the Institute of Health Sciences (IHS) for the OTs) who would eventually implement the framework were also invited. Thirteen experts received an electronic invitation and an informed consent form via e-mail. 10 responded, of which seven had experience of working within the eye care sector in Mozambique.

Steps 6, 7 and 8) The frameworks were distributed by email to the Delphi participants for the first round of scoring and comment. The results of the first round of frameworks were then analysed. For each statement, the mean rating was calculated together with the percentage of respondents scoring the competency above 5 (neutral point for a likert scale from 0 to 9).

As the literature on the Delphi technique does not stipulate a set level at which consensus is judged to have been reached, this was chosen based on what has been used in other similar studies.[18] In order for competencies to be automatically approved into the framework, two criteria had to be met. First the mean score for that competency had to be greater than five, and second, more than two-thirds of Delphi experts had to rate the competency greater than six. In order for a competency to be rejected outright, one of two criteria needed to be met, either that the mean score for that competency was less than five, or if more than two-thirds of Delphi experts had scored that competency less than five. The comments were coded for qualitative analysis

In the second round the frameworks were returned to the panellists in a similar format to round one. The summarised scores of each performance criteria with means and the individual respondents score were highlighted. This allowed participants to verify that their round one responses did indeed reflect their opinions and were given the opportunity to change their round one response now that the other research participant's answers had been shared with them. The round two frameworks, when completed, were returned for analysis. Where required, all borderline competencies would be returned to the panellists for a third round, in a similar format to round two until consensus was reached (2/3 majority) regarding their inclusion in the framework.

Step 9) The final frameworks which were agreed upon by consensus were then circulated to the relevant stakeholders for implementation.

Insert Table 1 here.

Results

There is little evidence-based information directly related to eye care and/or to mid-level eye care personnel in low income countries. Thus literature were sought about eye health and education; [22,23,24,25,26] competencies and competency-based training; [5,8,9,21,24,27] curricula for mid-level or allied eye health personnel; [26,28,29]; regional eye and health care needs [303132] and socially responsive medical education. [13,33]OT training requirements from Ministry of Health in Mozambique (MISAU) were sourced and reviewed.[34] For the optometrist cadre, frameworks from the WCO, UK General Optical Council, and departments of optometry at DIT and UKZN were all consulted.[7,16]

The overwhelming consensus from the participants at the COECSA competency development workshop was that refraction was a core component of the MLEP workload and needed more specific course outcomes. Additional competencies were proposed (e.g. population/ public health, including eye health promotion; technical and research and training) with a strong emphasis on social responsiveness designed to enable students to acquire an understanding of the refraction and eye health needs of their communities.

The core expectations of what is required of eye care personnel were regarded as generic competencies and skills (competencies 1, 2 and 3 in table 1). The draft list of competencies is demonstrated in table 1 and was collated under the section headings: 1- communication; 2-patient evaluation; 3- patient management; 4- community; 5-technical; 6- research and training. The draft framework consisted of these six units of competence, 19 elements and 80 performance criteria.

Development stage

The panellists reported that the draft framework took approximately one hour to rate. The main recommendation was to split the framework into two separate competency frameworks for the two cadres. For the optometrists, there was agreement on the inclusion of all of the elements and performance criteria.

For the OTs, elements 2.3: ability to assess oculomotor and binocular function; 3.2: ability to manage patients with an anomaly of binocular vision; and 3.3: ability to advise on and prescribe low vision devices (illustrated as ungraded gaps in the OT section of Table 1 below) were removed as all the framework development participants agreed that this was beyond the scope of training within an 18 month mid-level training course.

For both frameworks minor amendments were made. They included changing the first unit of competency from patient history to communication and adding an extra element (element 1.2) and four related performance criteria; and additions of performance criteria to elements 2.2, 3.1.2 and 3.4. All the additions have been shown as bold in Table 1 below.

The frameworks comprised six competencies, 20 elements and 88 performance criteria for optometry, and six competencies, 17 elements and 65 performance criteria for OTs. The revisions helped to clarify and to organise better the full-panel frameworks for Round 1.

Modified Delphi Round 1 and 2

Eight panellists out of ten graded both the optometry and OT draft frameworks. One graded only the OT draft framework and one only the optometry draft framework.

Optometry framework:

There was a 100% (9 responses) return for Round 1 framework and 89% (8 responses) in round two. The dominant themes to emerge from the Delphi participants qualitative statements included the collective view that there is a need to ensure competency in binocular vision, and low vision and to encourage graduates to access continuing education. Three of the Delphi participants mentioned that they were setting high standards for the optometrists when they graduated as they would not have access to supervision once they were in practise. Overall, panel consensus from the seven working in Mozambique and the two from outside was to keep the optometry framework in its entirety with all the competencies, elements and performance criteria.

OT framework:

There was a 100% return (9 responses) for Round 1 framework and 89% (8 responses) for round 2. Overall, there was consensus that assessing refractive status by objective and subjective means is seen as a necessary component of the skill-set of the OT. For the OTs four performance criteria achieved a mean score of less than five (indicating disagreement), and, for which, more than two-thirds of the panellists responded less than five. Hence, one element and four performance criteria were removed, all of which were related to optical dispensing. There were no borderline competencies. The dominant themes emerging from the qualitative statements included the need for provision of community eye care, and that objective and subjective refraction were significant portions of their training.

Table 1 below shows the competency elements and performance criteria and the corresponding scores at the end of round 2. The competency units of communication (1), community (4), technical (5) and research and training (6) were a priority for both cadres with

average scores >7 for all performance criteria. The main differences between the OT and

the optometry framework are the competencies in dispensing (excluded from the framework

by the main panel), and treating binocular vision and low vision (excluded by the

development panel). The frameworks were circulated for implementation in the only

Mozambican optometry training institution (Unilúrio), and the curriculum review committee at

the IHS for the national OT training programme.

Discussion

The competency frameworks will facilitate the design of training and development courses with distinct roles for both cadres. They will lead to refinement of program competency lists and content, development of baseline measures, and performance standards, and evaluation of educational outcomes. This will prevent confusion in terms of scope of practice. With the creation of OTs that are fully competent at refraction and optometrists that can carry out dispensing, binocular vision training and low vision therapy, the refraction needs of patients can start to be better addressed.

The Delphi consensus was to include competency 2.2: objective and subjective refraction as a primary component of the mid-level OT course. The recommendation to the IHS is to improve the refraction-training component of the current OT programme, in terms of quality and length of time devoted to the theoretical and practical aspects in order to facilitate students to achieve the competencies in the timeframe available.

The competencies of community and research and training, proposed at the COECSA workshop, were informed by elements of social responsiveness. [33] They respond to the eye health needs of the communities served, identify the determinants of eye health of the population, promote eye health at individual and community levels, and encourage research relevant to local eye programmes. The extent to which students will engage in the community will be an important indicator of social responsiveness.[35] Due to the lack of basic and ancillary workers with knowledge of eye care in Mozambique element 6.2 was proposed.[36] Training health personnel in eye care will assist the OTs and optometrists in the provision of primary eye care. These competencies along with the technical competency are

what differentiate this framework from the existing WCO framework, Australian and South African frameworks.

For OTs as mid-level personnel there are no competency frameworks in place in sub-Saharan Africa. The aim of the COECSA workshop was to establish competency frameworks leading to harmonisation of mid-level curricula.

There is no universally accepted uniform process for the use of a Delphi technique.[37] The number of participants, rounds and level of consensus sought is dependent upon the purpose of the research and resources.[20] The reported level of consensus in the literature ranges from 51% to 80%.[37] The level of consensus chosen at 66% of respondents rating the competency 6 or more (agreement on Likert scale), was based on literature from similar studies.[18] This ensured that when one person consistently graded the competencies lower than the other panellists, the overall result was not affected as demonstrated by the greater variance in the standard deviation for the OT group compared to the optometry group.

The Delphi group size does not depend on statistical power but rather on group dynamics for arriving at consensus among experts. The literature recommends 10-18 experts on a Delphi panel.[38] Selecting research participants is a critical component of Delphi research since it is their expert opinions upon which the output of the Delphi is based. The sample comprised of most of the available experts familiar with the Mozambican context. It is acknowledged that the use of a convenience sampling method for panel selection may have led to hidden bias. However, due to the limited number of people with expertise in the field of eye care education in developing countries, random sampling was not an option.

The use of the four person framework development panel was to take into account the legislative constraint of the length of the respective courses. OTs and optometrists have different levels of training. Grading a framework for each cadre ensured clarity of the competencies for the respective cadres. However, splitting the draft framework into two prior to the rest of the panel affected the eventual competencies. Including all the participants in the rating process and having the full panel make the decision to omit would have increased the validity of the process.

A limitation of this study was the potential lack of impartiality of the panellists who were working in Mozambique. It is likely that participants were willing to engage in discussions as they were more likely to be affected directly by the outcome of the process. Their commitment was related to their interest and involvement with the competency frameworks. The balance of panellists with expertise but impartial to the finished research is difficult to achieve.[39]

Another potential limitation of the Delphi technique is researcher influence on the formulation of the initial statements. Traditionally, round one is used to generate ideas and the panel members are asked for their responses to or comments about an issue. The modified Delphi procedure used in the current study was based on methods applied in other studies to develop competency frameworks for optometrists and medical sub-specialities.[18,19] It was recognised that this approach could bias the responses or limit the available options. To minimise this limitation the initial statements were based on a review of the previous literature on current best practice regarding education in eye care, observations from a competency workshop and feedback from the researchers' supervisors. Moreover, the Delphi panel had opportunities to refine and add further competencies.

The lack of input from the community, the end users of eye care services, who were not directly consulted about their needs and priorities, was another issue that arose from the study. Instead, information from the literature review and barriers to access to services was used to identify patient needs.[32] The barriers of lack of felt need, distance to travel and lack of awareness have been addressed in element 4 of the framework by requiring that health promotion and community outreach are part of their competency skill set. However, the barrier of costs, identified as the most significant, would need to be addressed by careful planning by policy makers.[32] Further the course includes competencies to enable graduates to work in partnership with their communities to adapt eye care services to meet local needs and expectations.

There has been an active debate in the literature on the validity and reliability of the Delphi technique.[40,41] As the panels participating in the study are representative of the group and the area of knowledge, then content validity can be assumed.[39] When consensus is achieved, it can be argued that there is evidence of concurrent validity, in that the experts themselves have agreed upon, the requisite skills.[40] The validity was further enhanced by the high response rate achieved. The continuous verification throughout the Delphi process by the use of successive rounds can improve the validity and reliability of the results.[37,38]

The challenges lie in the implementation of the framework and the task of addressing ongoing competency and retention of clinical knowledge post-qualification. The development of faculty and support to develop teaching and assessment capacities will require adequate resources and personnel.[42] The public should also expect practitioners to maintain an acceptable standard of practice (ongoing competence) that build on their initial knowledge and abilities (entry level competence), especially as a practitioner's independence of practice increases. The decay of competency can be slowed by access to continuing education or

workplace supervision by mentors.[43] Forming and strengthening the role of professional associations can help promote high standards of practice and empower health professionals.[44]

Understanding both the applications and the limits of competency frameworks is important in individual, program, and organizational assessment. The frameworks are working documents, to be continually refined and evaluated to ensure that competencies are adjusted to meet changing eye health needs and priorities; infrastructure, equipment, professional recognition, policy and legislation are in place; there are effective systems for supportive supervision and continuing professional development; and any other required improvements or adjustments can be made.[45]The definition of competencies in and of itself, however, does not guarantee quality of education.[46] Processes to measure education quality include certification examinations, which provide verification of clinical knowledge, student course evaluations, and measures of the care they provide. However, such information would only be available some time after implementation of the frameworks, emphasising the importance of a mid-term review of the framework to determine effectiveness.

The competency frameworks were developed specifically for OTs and optometrists in Mozambique with a Mozambique-focused Delphi panel. Addressing the limitations of bias introduced by the development panel, the small number of panellists and the lack of input from the community, could lead to the adaptation of the competency frameworks for use in other developing countries using an overall methodology that includes primary research data and the modified Delphi approach. A socially responsive, competency-based approach could enable a coordinated training and development model for all MLEP and optometrists in developing countries.

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