

(Unpublished Report)

Text-based Learning Resources  
for  
Primary Health Care Laboratory  
Staff  
in Developing Countries  
(Results from an international survey)

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## Introduction

In 1998 the World Health Organisation (WHO) pronounced a renewed call to support the Health for All (HFA) strategy in less developed countries (WHO, 1998). This call underlines the realisation that two decades after the Alma-Ata declaration (WHO, 1978), the implementation of Primary Health Care (PHC) strategies in less developed countries (LDCs) has come far short of the set target. In the policy paper on HFA in the twenty-first century, WHO (1997, p6) acknowledges that today *“Millions of people still do not have access to certain elements of primary health care and, in many places, effective primary health care services do not exist.”*

Especially, diagnostic laboratory services are often inadequate or missing at the intermediate and peripheral level in developing countries (Mallapaty, 1992). As pointed out by Carter (1992, p14) in the African Medical and Research Foundation's (AMREF) laboratory programme in eastern Africa, *“there was clearly a need to provide more intensive refresher training in basic techniques for laboratory staff.”* We need to question, how do health workers in developing countries diagnose and treat such common conditions as anaemia, malaria, tuberculosis and intestinal parasites, without reliable diagnostic laboratory tests?

Resources for public health services in LDCs are chronically scarce. Furthermore, health planners from governments and donor agencies often give little importance to laboratory services at the peripheral level. Even when funds are allocated for health laboratories, very often the bulk of funds are used for expensive and sophisticated equipment in a few central laboratories.

The necessity for strengthening human resource development in the primary health care field can hardly be questioned. As stated by Green (1994), in LDCs health services rely heavily on personnel, and therefore, training and development of laboratory staff could be considered the most efficient and cost-effective way of quality improvement. The challenge lies in finding workable and cost-effective solutions to the problem in an environment of scarce resources and mal-distribution of resources.

My assumption prior to this survey was that in the majority of developing countries training institutions needed better text-based learning resources and, to increase the competence of staff at the peripheral laboratory unit, standardised reference texts were needed. I also wanted to draw renewed attention to the issue of laboratory services in less developed countries in general and in particular to the need for better training and development of laboratory personnel.

Data collection was done through a self-completion questionnaire and structured interviews. The questionnaire was sent via E-mail to international experts in the field of health laboratory technology and distributed through personal contacts to health planners and college and university teachers in Amman, Jordan. A group of final year students at a college in Amman was interviewed. While note should be taken of the limited sample

size of twenty-seven questionnaires and ten interviews, the variety of respondents concerning location and work organisation represents a reasonably wide spectrum of opinions. However, I do recognise that further studies in this area are required to prove 'generalisability' of my findings.

The results of the study do support my assumptions. There is a clear support by all respondents that in developing countries training needs of laboratory personnel are not adequately addressed. There is a consensus that long term human resource development planning could remedy the status quo. All respondents (100%) concurred that learning resources and course design have to be developed to teach the student how to do the job and should reflect primary health care needs. There was also almost full agreement (96%) on the need for text-based reference material in each peripheral laboratory unit and that learning and reference material should serve as a course text and a resource during routine laboratory work.

Another major concern raised was the need for national policies to regulate curriculum development and to provide guidelines concerning essential test procedures, basic equipment and staff requirements at all levels of the health care system.

## **Review of important background information**

Resource-based learning can be defined as any learning system where the use of highly structured learning resources is central to the learning process, allowing learners a more flexible and learner-centred learning with the teacher taking the role of facilitator/counselor. Ellington, Percival and Race (1993, p164) point out that a true learning resource must meet all of the following criteria: *"be readily available, allow self-paced learning and cater for the individual needs of the learner."*

Extensive information is available on the use, effectiveness and cost-benefit of open and flexible learning at colleges, universities and in the workplace. (Dorrell 1993; Brewer, 1988; Clarke, 1982). Very little is known about the effectiveness and usefulness of resource-based, learner-centred and/or open learning systems for the training of primary health care personnel in developing countries.

The Keller Plan Approach, which was developed by Professor F. S. Keller of Columbia University in the USA, is an example of how independent study, self-paced learning and tutor support can be used within a college or similar institution (Ellington, et.al, 1993). The National Vocational Qualifications (NVQs) is a good example for the use of learner-centred, open learning systems in the workplace. As Wills (1993, p99) states, *"NVQs are not awarded on the basis of passing a training course. They are awarded on the basis of assessment of competence in the workplace."*

I believe that a combination of both systems could provide a possible solution of training and development needs of PHC laboratory staff in developing countries.

Basically, we are faced with two main problems. First, basic education is not sufficient to meet the needs of the workplace. After completion of training, PHC laboratory staff is very often not able to work independently at a peripheral laboratory unit. Second, refresher training and continuous staff development are required to improve the quality of care and update knowledge. Resource limitations call for cost-effective ( using minimum resource for the highest possible number of trainees ) and flexible (concerning time, place, individual needs) training solution.

Julie Dorrell (1993) sees resource-based learning as an open, flexible and cost-effective way of continuous staff training and development. She (ibid., p136) also believes that in the future *“more flexible forms of learning will become widespread in all sizes of organisations.”* Dorrell (ibid., p13,14) points out that using learning resources is easier *“for a group of people all engaged in similar work.”* This is clearly the case in the example of laboratory staff at PHC units in developing countries. However, she also cautions that learning resources may not be suitable for workers who are *“not motivated to learn under their own steam, or those who would learn better in a structured, controlled learning.”* In less developed countries, many learners are not familiar with the idea of self-directed learning. Learners are more familiar with learning styles as described by Freire (1970) with the teacher as the narrator and the student at the receiving end memorizing the narrated text. Laboratory staff is often not prepared to take responsibility for their own learning.

The challenge for teachers and health planners lies in developing suitable learning resources that can be used for basic course training at training institutions and at the laboratory unit for workplace, self-paced learning. Ellington, Percival and Race (1993, p89) suggest that flexible, learner-centred material may be developed via one of the following three paths: *(i) adapting existing material, (ii) providing a study guide to ‘conventional’ resources, or (iii) developing custom-designed self-contained material.*

## **Scope and aims of the investigation**

The initiative for this research project was taken for two main reasons. First, to draw renewed attention to the issue of training needs of laboratory personnel in developing countries. Second, to support qualitative information and common knowledge on the benefits and cost-effectiveness of resource-based learning with researched data. To broaden the scope of this study and to include the views of the beneficiaries of learning provisions, a selected group of college students was included.

It is not my intent to suggest or prove that the use of text-based learning resources is the only and best way to train PHC laboratory staff. Indeed, this would be a foolish attempt. What, I would like to achieve is to direct the experts' thoughts towards the idea of developing better learning resources for PHC laboratory personnel in LDCs. Learning resources that can be used as the main thrust for institution-based learning and work-based learning. Such learning resource might facilitate learning transfer from the

classroom to the workplace and bring long-term cost saving benefits to the training process.

Note must be taken of the limitations of this survey, with a total of twenty-seven questionnaires, eleven from international experts, five from health planners and six from university teachers and five from college teachers. Only ten students from one college in Amman were interviewed. Further in depth and thorough research would certainly be helpful.

## **Description of research method**

The initial data collection was through a three-page self-completion questionnaire ([See attachment 1](#)) and a covering letter ([See attachment 2](#)). The questionnaire contained mostly closed questions and few open-ended questions. The open-ended questions were included to obtain a broader idea why experts feel laboratory services are still inadequate at the peripheral level in developing countries and what could be done to change the status quo.

The questionnaire was sent via E-mail to a randomly selected group of experts in the field of health laboratory technology, i.e., WHO, PATH, AMREF, IAMLT. E-mail proved to be a fast, inexpensive and appropriate method to reach experts scattered all over the globe. At the local level in Amman, Jordan, the questionnaire was distributed through personal contacts. The return rate was 100% at the local level and about 12% for the questionnaires sent out via E-mail.

The lower return rate of questionnaires distributed via E-mail should not be considered as a negative impact on the outcome of the survey. Time and resources did not permit nor justify starting a large-scale survey. As pointed out by Kumar (1990), undoubtedly the most important justifications for mini surveys are limitation of time and resources. He further notes that mini surveys are most appropriate *when 'quantitative data are needed to supplement qualitative information.'* (Ibid, p5). While selection of respondents was done based on the informal method of convenience sampling, the variety regarding location, (i.e., Philippines, United Kingdom, Sweden, Jordan, Egypt, Tunisia, Afghanistan, Uganda, Japan) and work organisation, (i.e., WHO, AMREF, IAMLT, Training Institutions and Health Planners in Jordan), represents a reasonably wide spectrum of opinion.

A group of final year students at the Intermediate University College in Amman, Jordan were interviewed. The college course is a two-year training. The interviews took place at the college and each student was interviewed individually following a set of six questions ([See attachment 3](#)). The main reason for including the students was to generate further information about training and the use of learning resources at colleges expressed by the beneficiaries of training. Though the sample of students was very small and only from one college, it did generate qualitative data to suggest and recommend

future and more elaborate studies.

## **Summarised analysis of findings**

### **Questionnaire findings**

There was a wide range of opinions concerning questions with general statements. For example, health services in developing countries lack basic services; personnel lack information and training; laboratory services are not feasible because technology is too sophisticated, imported and not appropriate; curricula at training institutions usually cover the needs of PHC laboratory services; trainees can work independently after graduation.

Tutors, health planners and international experts in the field all agreed that in developing countries, efforts to establish and expand public health laboratory networks with an emphasis on PHC should be supported. Further, they fully supported the statement that PHC laboratory personnel must have good technical and managerial skills. Most respondents (85% or 23 out of 27) disagreed with the rather probing statement that laboratory services at the periphery should be abolished and all patients referred to higher-level health care facilities.

While only 70% of the respondents felt that in developing countries, PHC laboratory personnel still lacked basic technical skills, the majority (89%) agreed that human resource training could be considered the most efficient and cost-effective way of quality improvement.

All respondents (100%) concurred that at training institutions learning resources and course design have to be developed to teach knowledge and practical skills - to teach the student how to do the job -, and should reflect primary health care needs. There was also almost full agreement (96%) on the need for text-based reference material in each peripheral laboratory unit and that learning and reference material should serve as a course text and a resource during routine work at the laboratory unit. Similar common consent was expressed to the statement that written procedures instructions with step-by-step explanation of the task help students learn and teachers teach and assess skills.

A country specific standard operation procedures manual that includes all essential laboratory tests required for the different levels of the PHC system was considered a valuable teaching and learning resource for students at teaching institutions by 74% of all respondents. 63% felt it would be a valuable reference for staff during their daily routine work and 59% thought that it would ensure that all staff are working to standard procedures. Only 44% of the respondents thought that this could be a cost-efficient means for training and staff development. Most (78%) did not agree that the bulk of the cost involved is related to writing the manual and training staff how to use

the manual.

Relating to practical skills training, 89% (24 out of 27) of the respondents consented that at least two thirds of the training course time should be spent at learning and practicing practical skills. Looking at how practical skills are taught best, all (25 with 2 no reply) agreed that describing, demonstrating and allowing each student to practice the skill was most important. 56% of all respondents and 73% of tutors felt that besides the above, handing out written instructions was important.

Laboratory health planners in Jordan agreed 100% that there was a need for national policies to regulate curriculum development and to provide guidelines concerning essential test procedures, basic equipment and staff requirements at all levels of the health care system. Tutors and international experts also mostly agreed (82% and above) to the need for better national policies concerning health laboratories in developing countries.

Finally I will give a summary of opinions expressed, why laboratory services at the peripheral level are inadequate and what could be done to change this status quo.

#### **The problems:**

- Educational and training needs of laboratory personnel in developing countries are not adequately addressed. This includes all aspects, i.e., infrastructure, curriculum development, assessment criteria, teachers' qualification, basic training, refresher training and budgetary constraint.
- Government and political forces do not recognise the importance of laboratory services at the peripheral level. Therefore, policy makers give lowest priority to laboratory services. Furthermore, there is little sense of 'belonging to a profession' and professional organisations lack the force to generate change.
- In developing countries there is a persistent lack of financial resources for health services in general and laboratory services in particular.
- Clinical staff often disregard the clinical value of laboratory results. They are uninformed about the use and interpretation of laboratory test results.

#### **The solutions:**

- Long term human resource development planning that embraces all aspects of training such as curriculum development, learning resources, basic and refresher training and teachers' training.
- Improve government support and policies pertaining to laboratory services. Increase the involvement of laboratory personnel (professional groups) in the policy planning and formulation process. Furthermore, increase the financial commitment to primary health care services.
- Control and raise the standard of laboratory test results by establishing quality control networks (both internal and external) at the national level.
- Organise training courses for clinical staff, emphasising the importance of

laboratory results in patient management at all levels of the health care system.

A detailed, four page summary ([See attachment 4](#)) of questionnaire results is attached to this report.

## **Student interview findings**

It was found that most students (eight out of ten) intended to work at a hospital in the future as they perceived it easier to work at hospitals where all modern equipment would be available. In this context, it is important to note that all those intending to work at a hospital had done their mandatory, external practical training in a hospital laboratory. One student had done the practical training at a comprehensive health centre laboratory near her home in Zarqa and she intended to return there to work after graduation. *Further investigations could be carried out, about how much students are influenced by the choice of venue of the mandatory, external practical training.*

All the students found that practical skill training at the college could be increased but many expressed that time constraints did not permit them to have more practical skills training. Two students felt that they could receive the additional practical training in their workplace after graduation with the help of experienced colleagues. This suggests that more practical training is needed which is most likely to be learnt in the workplace but not at the college. *More structured work-based training and refresher courses might be a solution to this problem. Again this would require a more thorough study.*

Concerning organisational and managerial skills most students (nine out of ten) thought that they were not competent enough. Tasks such as managing stock, organising daily routine work or changing the bulb of a microscope seemed difficult to them. Only one student replied with confidence that she could change the bulb of a microscope. Surprisingly, it was the student that had done practical training at the comprehensive health centre laboratory and not in a hospital.

Opinions were divided about text-based learning resources used and available at the college. The teachers often ask the students to investigate and write small reports about topics such as instruments or procedures. For practical procedures, most students felt that they preferred to make their own notes rather than having notes provided by the teacher. They felt that writing notes helped them in understanding the procedures better. However, when asked if such notes would be useful to them for revision and to refer to in the workplace, most replied that a book or printed notes would be better. *Further investigation concerning text-based learning resources would certainly be useful.*

When asked about being able to work at a PHC centre laboratory after graduation, most students (eight out of ten) felt it would be very difficult for them. The reason for facing difficulties, most often mentioned, was that there were no machines at such centres and all methods had to be done manually. Again, the student that had done practical training at the comprehensive centre thought she could do the work, provided

the workload was not too much. A second student was also very confident and said she could do it. A teachers later told me that she was considered as one of the best students.

## **Final analysis and conclusion**

In many developing countries diagnostic laboratory services are still unreliable and inadequate. Laboratory personnel lack basic skills to work independently at a peripheral laboratory unit. Health service resources are limited and therefore, the challenge lies in finding workable and cost-effective staff training solutions.

Over the past twenty years, health planners from governments and international agencies have neglected the diagnostic laboratory sector in developing countries. Furthermore, clinical staff often disregard the value of laboratory results in patient management at all levels of the health care system. At the national level, increased participation of laboratory personnel and professional groups in the policy planning and formulation process would certainly be desirable.

College and university teachers, health laboratory planners and international experts all agreed that in developing countries efforts to establish and expand reliable public health laboratory networks with an emphasis on PHC should be supported. The majority also concurred that text-based learning resources help students learn and teachers teach and assess students. Besides, that at training institutions learning resources and course design should reflect PHC needs, 'teaching students how to do the job'. Wide agreement was also expressed about the need for text-based reference material in each peripheral laboratory unit.

A well-trained, flexible and motivated workforce is essential for quality improvements. Text-based, learner-centred learning resources might be a possible solution. In western countries, resource-based learning is increasingly used in higher education and in the workplace. Regrettably, still very little is known about the effectiveness and usefulness of resource-based, learner-centred and/or open learning systems for the training of primary health care personnel in developing countries.

The limitations of this mini survey are obvious, with only twenty-seven questionnaires and ten informant interviews. Nevertheless, it did generate a consolidated base of information and 'food-for-thought'. Country-specific, text-based learning resources suitable for both, institution-based learning and work-based learning might facilitate learning transfer from the classroom to the workplace and bring long-term cost saving benefits to the learning process. Further in depth research or pilot projects in this field would certainly be helpful.

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## Attachment 1

### “Mini-survey” Primary Health Care Laboratory Services in Developing Countries and Learning Resources.

For questions 1 - 19, please tick ( ) one box which most closely reflects your views. The last column “Remarks” provides space for any further comments. You may also use the back of the page for further comments.

No	Question	Agree strongly	Agree	No strong views	Disagree	Disagree Strongly	Remarks
1	Health services in developing countries are lacking basic laboratory services.						
2	Laboratory personnel at the peripheral and intermediate level lack information and training.						
3	In developing countries, efforts to establish and expand public health laboratory networks with an emphasis on primary health care (PHC) should be supported.						
4	In developing countries, it would be best to abolish laboratories at the peripheral and intermediate level and refer all patients to district and regional hospital laboratories.						
5	Laboratory services at the PHC level in developing countries are not feasible because laboratory technology is mostly imported, too sophisticated and not appropriate.						
6	Laboratory services at the peripheral level can only be improved if national policies are formulated and implemented.						
7	National policies have to regulate curriculum development at training institutions.						
8	National policies have to provide guidelines concerning essential test procedures, basic equipment and staff requirements at all levels of the health care system.						

No	Question	Agree strongly	Agree	No strong views	Disagree	Disagree Strongly	Remarks
9	Human resource training and development could be considered the most efficient and cost-effective way of quality improvement.						
10	In many developing countries, PHC laboratory personnel still lack basic technical skills.						
11	Laboratory staff at a PHC laboratory unit must have good technical and managerial skills.						
12	Curricula at training institutes for laboratory personnel in developing countries usually cover the needs of PHC laboratory services.						
13	Trainees are able to work independently at a peripheral laboratory unit, after they complete their course.						
14	In each peripheral laboratory unit reference material in form of books or written instruction should be available.						
15	Learning and reference material should serve as course text as well as source of reference during routine work at the laboratory unit.						
16	At training institutes learning material and course design has to reflect primary health care laboratory needs.						
17	At training institutes learning material and course design has to be developed to teach knowledge and practical skills - to teach the student how to do the job.						
18	Students at training institutes should spend at least two thirds of the course time at learning and practicing practical skills.						
19	Written procedure instructions with step-by-step explanations of the task help students to learn and teachers to teach and assess skills.						

**20** Please tick ( ✓ ) mark one of the following answers. Practical skills are taught best by:

- Describing the skill.
- Describing and demonstrating the skill.
- Describing, demonstrating and allowing each student to practice the skill.
- Handing out written instructions describing the task, demonstrating the skill by the teacher and thereafter allowing each student to practice.

**21** Please tick ( ✓ ) mark one of the learning resources listed below that you find most useful to train primary health care laboratory personnel (Only one answer, please!)

- A standard text book on laboratory technology produced in the developed world.
- Video and audio cassette-taps
- Handwritten notes and handouts
- Standard operation procedure's manual, including all essential laboratory tests, with step-by-step procedures, inclusive of equipment and supplies required.
- None of the above, Please specify your choice.....

**22** A country specific standard operation procedures manual that includes all essential laboratory tests required for the different levels of the PHC system is useful for the following reasons: Please tick ( ✓ ) mark one or more answers. (Multiple answers allowed!)

- It is a valuable teaching and learning resource for students at teaching institutions.
- It is a valuable reference for staff during their daily routine work.
- It will ensure that all staff are working to standard and clearly understood procedures.
- It provides a cost-efficient means for training and development of PHC laboratory staff.
- The bulk of the cost involved are initial cost of writing the manual and training cost of staff to teach them how to use the manual.
- None of the above.

**23** Please list the three most important points why you feel that after two decades of PHC strategy implementation in developing countries, laboratory services still do not exist or are inadequate at the peripheral level.

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**24** Please list three ways you would suggest to change this situation.

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- 
- 

**Thanks you for your support**

Please send the completed questionnaire to:

E-mail: [gmallapaty@hotmail.com](mailto:gmallapaty@hotmail.com)

## **Attachment 2**

### **Covering letter:**

Dear Madame/ Sir,

### **Subject: “Mini-survey” Questionnaire**

I would be grateful if you could give a few moments of your valuable time to complete the attached questionnaire. This has been designed to gather data in order to evaluate the usefulness and cost-effectiveness of learning resources for primary health care (PHC) laboratory services in developing countries. This survey is part of my project assignment on “Workplace Learning and Assessment,” towards a MSc degree in Health Services Management. Furthermore, it is my intention to draw attention to the issue of PHC laboratory services in general and to the need for better training and development of PHC laboratory personnel in developing countries.

I am a Medical Laboratory Technologist with many years of experience. Starting my career in Germany, I specialized over the years in the field of basic laboratory services in developing countries. I have practical professional experience in the establishment of clinical laboratories and basic laboratory development planning and training in Sudan, Zaire, China, Nepal and Jordan.

The scope of this study is limited to a selected group of experts in the field of health laboratory technology, health planners and teachers at training institutions in developing countries. If you would be interested in receiving a summary of the findings of this research project, I would be pleased to provide this.

Please accept my thanks and sincere gratitude in advance, for taking the time and completing the questionnaire.

Yours sincerely,

Gabriele Mallapaty

Attached: Three Page Questionnaire

## **Attachment 3**

### **Questions of Structured Interview of College Students:**

1. Where do you intend to work after graduation?  
Is it your choice or do you have to work at a certain place?
2. How do you feel about the skill training (practical training) you receive during your studies?
3. How did the teachers teach you practical skills?  
Please describe in detail using for example stool examination or blood sugar test.
4. How would you rate your managerial and organisational skills?  
Skills such as stock taking, inventory, cleaning & maintenance of instruments, organising your daily routine work. What do you feel you should have been taught more?
5. What is your opinion about text-based (books, written instructions, handouts) learning resources used during your training?
6. If you had to work at a PHC or Comprehensive Health Care Centre laboratory, where you are the only technician, immediately after graduation, what do you feel, could you do the job easily?

## Attachment 4

<b>Summary of Questionnaire Results</b>					
<b>Question No. 1</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	1	2	1	1	
University Tutor (6)	1	2	2		1
Health Planner (5)				2	3
Expert in the field (11)	3	7		1	
<b>Question No. 2</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)		2	1	2	
University Tutor (6)		2	2	1	1
Health Planner (5)	3	2			
Expert in the field (11)	3	6	2		
<b>Question No. 3</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	3	2			
University Tutor (6)	3	3			
Health Planner (5)	3	2			
Expert in the field (11)	7	3	1		
<b>Question No. 4</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	1			4	
University Tutor (6)		1		2	3
Health Planner (5)			1	2	2
Expert in the field (11)			1	7	3
<b>Question No. 5</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)		3	2		
University Tutor (6)		1	2	2	1
Health Planner (5)		1		4	
Expert in the field (11)		1	3	5	2
<b>Question No. 6</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	1	3		1	
University Tutor (6)	1	3		2	
Health Planner (5)	3	2			
Expert in the field (11)	4	4	3		
<b>Question No. 7</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	1	4			
University Tutor (6)	1	3		2	
Health Planner (5)	1	4			
Expert in the field (11)	1	9		1	

<b>Summary of Questionnaire Results</b>					
<b>Question No. 8</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	2	3			
University Tutor (6)	3	2	1		
Health Planner (5)	3	2			
Expert in the field (11)	4	6	1		
<b>Question No. 9</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	3	2			
University Tutor (6)	1	3	1	1	
Health Planner (5)	3	2			
Expert in the field (11)	6	4	1		
<b>Question No. 10</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)		3	1		1
University Tutor (6)		3	2	1	
Health Planner (5)	2	3			
Expert in the field (11)	4	4	1	2	
<b>Question No. 11</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	3	2			
University Tutor (6)	4	2			
Health Planner (5)	3	2			
Expert in the field (11)	2	9			
<b>Question No. 12</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)		2	2	1	
University Tutor (6)		2	2	2	
Health Planner (5)		1	1	3	
Expert in the field (11)		4		6	1
<b>Question No. 13</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)		1	1	3	
University Tutor (6)		1	2	2	1
Health Planner (5)		4	1		
Expert in the field (11)		4	1	5	1
<b>Question No. 14</b>	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>
College Tutor (5)	4	1			
University Tutor (6)	2	4			
Health Planner (5)	1	4			
Expert in the field (11)	8	2	1		

<b>Summary of Questionnaire Results</b>						
Question No. 15	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>	
College Tutor (5)	3	2				
University Tutor (6)	2	4				
Health Planner (5)	2	3				
Expert in the field (11)	6	4	1			
Question No. 16	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>	
College Tutor (5)	3	2				
University Tutor (6)	3	3				
Health Planner (5)	4	1				
Expert in the field (11)	3	7	1			
Question No. 17	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>	
College Tutor (5)	3	2				
University Tutor (6)	3	3				
Health Planner (5)	5					
Expert in the field (11)	7	4				
Question No. 18	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>	
College Tutor (5)	4		1			
University Tutor (6)	3	3				
Health Planner (5)	2	3				
Expert in the field (11)	7	2	1	1		
Question No. 19	<b>Agree Strongly</b>	<b>Agree</b>	<b>No Strong Views</b>	<b>Disagree</b>	<b>Disagree Strongly</b>	
College Tutor (5)	3	2				
University Tutor (6)	3	2		1		
Health Planner (5)	1	4				
Expert in the field (11)	8	3				
Question No. 20	<b>Skill demo</b>	<b>+Description</b>	<b>+ Practice</b>	<b>+ Handout</b>		
College Tutor (5)			1	4		
University Tutor (6)			2	4		
Health Planner (5)			2	2		1 No answer
Expert in the field (11)			5	5		1 No answer
Question No. 21	<b>Text book</b>	<b>Video/Audio</b>	<b>Handout</b>	<b>SOP Manual</b>	<b>None of above</b>	
College Tutor (5)			1	3	1	
University Tutor (6)	1			4		1 No answer
Health Planner (5)				5		
Expert in the field (11)			1	8		2 No answer

Summary of Questionnaire Results						
Question No. 22	Resource	Reference	Standard	Cost-efficient	Cost involved	None of above
College Tutor (5)	4	2	2	2	1	
University Tutor (6)	4	3	2	1	1	1
Health Planner (5)	5	5	5	4	1	
Expert in the field (11)	7	7	7	5	3	
Question No. 23						
College Tutor (5)	<ul style="list-style-type: none"> <li>• Lack of responsibility of teaching staff and students</li> <li>• Not enough practical training for students.</li> <li>• Lack of financial resources</li> <li>• Lack of equipment</li> <li>• Lack of government support</li> <li>• Human resource training policies are missing</li> <li>• Lack of refresher training for teachers and lack of training abroad</li> <li>• Lack of refresher training after graduation.</li> </ul>					
University Tutor (6)	<ul style="list-style-type: none"> <li>• Lack of equipment and supplies.</li> <li>• Training of PHC laboratory staff in not sufficient</li> <li>• Lack of government support.</li> <li>• Low salaries and lack of incentives.</li> <li>• Lack of proper management, particularly at higher levels.</li> <li>• No refresher training, thus information and techniques are outdated.</li> <li>• Doctors do not value laboratory technicians and their contributions.</li> <li>• Teaching staff not qualified enough to teach and assess students.</li> <li>• Policy makers do not make the right choices.</li> </ul>					
Health Planner (5)	<ul style="list-style-type: none"> <li>• Lack of personnel and incentives.</li> <li>• Insufficient training courses</li> <li>• Insufficient budget for laboratory services.</li> <li>• Policy makers place laboratory services at the bottom of their priority list.</li> <li>• High staff turnover.</li> <li>• PHC laboratory staff not sufficiently qualified.</li> <li>• Health planners at the MoH are often ignorant about the need and importance of laboratory services</li> </ul>					
Expert in the field (11)	<ul style="list-style-type: none"> <li>• Laboratory staff not involved in policy making</li> <li>• Lack of basic equipment and training policy.</li> <li>• Developing countries offer free health service yet have meagre budget</li> <li>• Clinical staff managing peripheral health units do not know the clinical value of laboratory results.</li> <li>• Clinical staff managing peripheral health units do not know how to interpret lab results</li> <li>• Insufficient value is placed on the importance of laboratory diagnosis.</li> <li>• Lack of financial resources for health services in general</li> <li>• Lack of awareness of importance of PHC laboratory services by central government</li> <li>• Failure of support from district and regional laboratory services.</li> <li>• Political instability</li> <li>• Piecemeal approach to education and training, no solid infrastructural support.</li> <li>• More urgent issues within the country</li> <li>• Low quality of training, poor academic standards, no feeling of belonging to a profession.</li> <li>• Lack of professional organisations to help facilitate progress</li> </ul>					

Summary of Questionnaire Results	
Question No. 24	
College Tutor (5)	<ul style="list-style-type: none"> <li>• Financial support to PHC</li> <li>• Establish human resources training policies.</li> <li>• More practical training at colleges.</li> <li>• Refresher training for teachers.</li> <li>• Provide training and procedure manuals for each lab.</li> <li>• Teach students more responsibility and liking for the job.</li> </ul>
University Tutor (6)	<ul style="list-style-type: none"> <li>• Establish a quality control network at the national level</li> <li>• Better policies and government support.</li> <li>• Teach doctors to respect lab results and lab technicians.</li> <li>• Hold regular refresher training courses</li> <li>• Provide all laboratories with step-by-step procedure manuals</li> <li>• Improve the managerial system.</li> <li>• Increase salaries</li> <li>• Provide adequate equipment to PHC laboratories.</li> </ul>
Health Planner (5)	<ul style="list-style-type: none"> <li>• Allocation of sufficient budget for laboratory services.</li> <li>• Organisation of training courses for laboratory personnel.</li> <li>• Implementation of Internal and external quality control measures.</li> <li>• Provide Public Health Laboratories with sufficient resources.</li> <li>• Regular training and refresher training of personnel.</li> <li>• Establish a national quality control programme.</li> </ul>
Expert in the field (11)	<ul style="list-style-type: none"> <li>• The establishment of a national health training centre where groups from different areas are trained.</li> <li>• Encourage health authorities to give priority to health laboratory services.</li> <li>• Better equipment and consumables management.</li> <li>• Rigorous curriculum development, to reflect best practice both academically and practically.</li> <li>• Close monitoring of examination standards.</li> <li>• Use of expatriate teachers and trainers until local teaching staff are able to carry on.</li> <li>• Organise professional groups.</li> <li>• Establish links to international organisations such as IAML.T.</li> <li>• Long term planning together with local laboratory staff to improve education and training.</li> <li>• Have laboratory staff participate in health policy planning and making.</li> <li>• See WHO recommendations LAB/98.1</li> <li>• Use fee collection for lab services to establish lab revolving funds.</li> <li>• Orientation of clinical staff in the role of lab results in patient management, at all levels of the healthcare system.</li> </ul>