World Health Organization
REGIONAL OFFICE FOR Europe

REVIEW AND REVISION OF LABORATORY CURRICULA

Annexes

Address requests about publications of the WHO Regional Office for Europe to:

Publications
WHO Regional Office for Europe
Marmorvej 51
DK - 2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office website (http://www.euro.who.int/pubrequest).

Contents

Annexes

Annex 1: Example outline of a curriculum

1. Introduction and rationale of programme
2. Mission of programme
3. Core competencies of graduate
4. Job profile/job description(s)
5. Entry requirements and selection criteria of students
6. Overall learning objectives
7. Educational approach/teaching methods
8. Sequence of courses/modules
9. Objectives/content per unit and lesson, including qualification of facilitators
10. Programme and duration per session, tutor guide
11. Assessment (policy, methods, guides)
12. Quality assurance mechanism including methods of evaluation
13. Outline of human, physical and administrative requirements

Annex 2: Example of programme of workshop 1, curriculum review

Day 1 9:00 - 17:00		Objectives	Facilitator/material/methods
1	Workshop opening - welcome and introductions	▪ Welcome the participants	MoH, MoHE and WHO
2	Discussion of workshop objectives	▪ Provide overview of where we are in the project describe the purpose of this workshop ▪ Expectations of the participants	Facilitators
3	The national educational system for laboratory workers	▪ Presentation to get a common understanding of the national educational system for laboratory workers	Ministry of Health/Ministry of Education
4	Outcome and discussion of the training curriculum assessment	▪ Present and discuss the outcomes of the analysis of the training curriculum assessment	Facilitators
Break			
5	Curriculum development	▪ To get an overview of the curriculum development process	Facilitators
6	Identify requirements for successful development of curriculum	▪ Identify successes, challenges and opportunities	Facilitator Group work and group discussions
Lunch			
7	Definition of competencies	▪ To define the competencies for the different levels of laboratory workers	Plenary discussion
Break			

Day 2 9:00 – 17:00			
1	Recap	▪ Summary of the main outcomes of day 1; presentation of draft competencies	Facilitators
2	Finalization of competencies	▪ To finalize the competencies of laboratory doctor and bio-technician	Plenary discussions
Break			

3	Comparison of competencies and learning outcomes	▪ To compare the developed competencies with the existing learning outcomes/objectives of the curricula ▪ To identify what is lacking in the curricula	Group work
	Topics/methods for improvement	▪ Identify topics for improvement of the training curricula based on gap analysis	Group work
Lunch			
	Group presentations	▪ Topics for improvement of the training curriculum: comparison competencies and learning outcomes	Plenary discussion Facilitators
Break			
4	Preconditions for improvement of the training curriculum	▪ Identify preconditions for improvement (material, facilities, teachers)	Plenary discussion

Day 3 9:00 - 17:00		**Objectives**	**Facilitator/material/methods**
1	Recap	▪ Summary of the main outcomes of day 2	Facilitators
2	Quality assurance	▪ Identify quality assurance issues of training curricula: who to involve and why	Presentation and group work
Break			
3	Assessment	Review assessment (examination methods), including role of stakeholders	Presentation and discussion
Lunch			
	Assessment (continued)	Review assessment (examination methods)	Presentation and discussion
Break			
4	Development of learning objective	▪ Develop learning objectives for a chosen session or module	Facilitators/Group work

Day 4 9:00 – 17:00			
1	Recap	▪ Summary of the main outcomes of day 3	Facilitators
2	Choice of learning and teaching methods	Identify which learning objective to combine with which learning method	Facilitators/Group work
Break			
3	Development of a lesson plan	▪ Develop a lesson plan	Facilitators/Group work
Lunch			
4	Discussion of one learning method	▪ Discuss and practice one learning method	Facilitators/Group work
Break			
5	Planning the way forward	▪ Identification of the next steps	Plenary session
6	Evaluation and closure of the workshops	▪ To evaluate and close the workshop	Facilitators/group/ invited guests

Annex 3: Sample programme of workshop 2: curriculum review

Day 1 Session		Objectives	Facilitator/material/methods
1	Workshop opening - welcome and introductions Discussion of workshop objectives	▪ Welcome of participants ▪ Provide overview of where we are in the project; describe the purpose of this workshop ▪ Expectations of the participants	Representative of Ministry of Health, facilitators
2	What has been done in between the workshops?	▪ Provide overview of process and activities for curriculum development	Presentation Country representative
3	Discussion on validated competencies	▪ To discuss competencies of the 3 different target groups, alignment, changes and confirmation	Presentation Discussion
4	Curriculum development: own development of sub-competencies	▪ Development of sub-competencies	Facilitators Presentation Group work Group discussions

Day 2 Session		Objectives	Facilitator/material/methods
1	Reflection on yesterday	▪ To reflect on yesterday ▪ What was learnt	Group discussion
2	Two rounds on development of sub-competencies including presentations, validation and discussion	▪ Development of sub-competencies	Group work Group discussion
3	From competencies to sub-competencies, learning objectives and student assessment	▪ To identify topics to teach ▪ How to formulate learning objectives for three domains of learning	Facilitators Presentation Group work Group discussions
3	Two rounds of group work on learning objectives development, including presentations, validation and discussion	▪ Development of learning objectives	Group work Group discussion

Day 3 Session		Objectives	Facilitator/material/methods
1	Reflection on yesterday	▪ To reflect on yesterday ▪ What was learnt	Group discussion
2	Updating the curriculum to assure competence for other competencies of CanMed framework	▪ Assess degree to which curriculum matches requirements for development of competences ▪ Identify new topics or for need for updating existing material	Group work Group discussion
3	How do we learn	▪ Presentation	Presentation
4	Learning of skills	▪ To learn different steps involved in learning skills	Presentation and return-demonstration
5	Choice of teaching and learning methods	▪ Discuss different types of teaching and learning methods and criteria to choose	Group work
6	Microteaching	▪ To practice teaching in small groups	Practice, feedback

Day 4 Session		Objectives	Facilitator/material/methods
1	Reflection on yesterday	▪ To reflect on yesterday ▪ What was learnt	Group discussion
3	Assessment of learning	▪ Discuss different forms of assessments	Presentation, Ppt 3.1
4	Steps involved in constructing an exam	▪ To outline the steps of an assessment	Presentation and group work
5	Development of an assessment	▪ To develop an assessment	Group work, presentation and feedback
6	Planning the way forward	▪ Identify next steps	Group work/Plenary session
7	Evaluation and Closure of workshop		Plenary session

Annex 4–1: Health laboratory personnel educational system description

Introduction

Well-functioning, sustainable laboratory services are an essential part of strong health systems and are crucial to improving public health. In addition, countries worldwide committed themselves to build national laboratory capacities for the detection of and response to public health events of international concern when they decided to engage in the International Health Regulations implementation process. Qualified laboratory workers are the most important laboratory resource and crucial partners in health care.

The World Health Organization aims to assist in strengthening national laboratory capacities. One of the approaches is focused on the national education system for laboratory personnel and the first step is this survey. This survey is addressed to educators, laboratory directors/managers, students and ministerial representatives with the goal to form an overall picture of current education and training for national laboratory personnel. The results of the survey will be discussed with all stakeholders at workshops. Review of the national education system by the stakeholders will help to identify strong and weak points of the system and plan steps for improvement of laboratory personnel education.

The survey consists of a number of interviews, structured by using interview guides. The persons to be interviewed are:

- educators,
- laboratory directors/managers,
- students and
- ministerial representatives.

Educators should include those who are responsible for the education and training of the different types of personnel working in the national health laboratories: laboratory assistants, laboratory technicians (feldshers), laboratory doctors, laboratory managers, laboratory scientists, postgraduate laboratory specialists. From each type of educational programme two students, preferably in their last year before graduation, should be interviewed. Laboratory directors/managers should include directors/managers of the different types and levels of the laboratories: public health, clinical, private and other laboratories at the national, provincial/regional level, as well as at the lowest level. From the ministries 1-2 each at the Ministry of Health and the Ministry of Education need to be interviewed; those who are responsible for health laboratory personnel and their education. It is proposed to interview 26-29 people for the survey which by estimate will take 57-98 hours in total.

Analysis: After the interview have been conducted, the analysis sheets can be filled in. In the analysis sheets the information to be provided, corresponds with the number of the question in the interview guide.

Workshop with stakeholders. All stakeholders, everybody interviewed, except the students, should be invited to the workshop. As such, the workshop offers a unique and rare opportunity for educators and laboratory managers/directors to meet face-to-face and discuss the current state and the future of the educational system for laboratory personnel. Before the workshop the results of the survey will be analyzed by the leader of the project and a summary of the survey will be presented at the beginning of the workshop and discussed and validated by the participants.

Additional objectives of the workshop can include the development of competencies of each type of health laboratory personnel. These competencies can then be used to further review and improve the curriculum. All the action points and recommendations generated during the workshop will be noted for future use.

Annex 4–2a: Data analysis sheet

Time expected to do the interviews and the data analysis

Setting up appointments: per interview average: 15 minutes, depending on situation of country.

Interviews: Total 57-82 hours

- Ministry level: 2-3 of 1-2 hours each. Total: 3-6 hours
- Educational institutions: 2 x 5= 10 interviews– seems quite a lot, but this is if all programmes are separate interviews of 4-6 hours each. Total 40-60 hours
- Laboratory managers: 6-8 interviews of 1 hours each. Total 6-8 hours
- Students: 8 interviews of 1 hours each. Total 8 hours

Analysis**:** 2-3 days

Overview Analysis sheet

Topic	Question from questionnaire
1. Education: types of professionals and education capacity	M 1, M 8 TG 1-5
2a. Laboratory system absorption capacity	M 2-5, M 8 E 2 TG 6-7 S 16
2b. Planning of laboratory personnel	M 6-10, M 14 E 2, E 8 TG 7-8, S 2
3a. Curriculum/Education programme	TS 1-8 E 3-6
3b. Teaching and learning methods	TS 9-16 S 6-7, S 9-13
3c. Educational facilities	TS 23-24 S 8
3d. Quality	M 11-12 TS 20-22, TS 25, TS 31, TS 41 S 13-15
3e. Teachers	TS 26-31
3f. Examinations	TS 32-40 S 12
4. Collaboration between different stakeholders	M 13-18 E 7a-b TS 17-19
5. Other suggestions	M 19 E 9 S 17

Annex 4–2b: Summary laboratory educational system and curriculum review

Summary laboratory educational system and curriculum review in ... *(fill in country name)***,**

Part 1 and 2: Education, laboratory absorption capacity and planning laboratory personnel

1. Education: types of professionals

	Where trained (institution(s)) (TG, M1)	Entry requirements (TG2)	Duration of curriculum/ training (TG 3)	Number trained per year (TG 4, M7)
Laboratory assistants (Lower level)				
Laboratory technicians (lab felshers)				
Laboratory doctors: specialists with higher education in laboratory diagnostics Note: nr of hours of lab training in MD curriculum:				
Laboratory managers				
Laboratory scientists				
Postgraduate				

Note: please try to clarify what are the national/local names of the types of professionals, this may vary from country to country

2.a. Laboratory system absorption capacity

Note: Different respondents are asked whether there is a sufficient production or over- or underproduction of certain type of professionals. By asking the different respondents these opinions are triangulated to get a more complete picture.

	Employed where: **Public lab %** **Clinical lab %** **Private lab %** **Other/Outside% (TG6)**	**Employed where:** **At central level:** **At intermediate level:** **At peripheral level:** **At private: (M2-5)**
Laboratory assistants (Lower level)	Public lab % Clinical lab % Private lab % Other/Outside%	At central level: At intermediate level: At peripheral level: At private:
Laboratory technicians (lab felshers)	Public lab % Clinical lab % Private lab % Other/Outside%	At central level: At intermediate level: At peripheral level: At private:
Laboratory doctors: specialists with higher education in laboratory diagnostics Note: nr of hours of lab training in MD curriculum	Public lab % Clinical lab % Private lab % Other/Outside%	At central level: At intermediate level: At peripheral level: At private:
Laboratory managers	Public lab % Clinical lab % Private lab % Other/Outside%	At central level: At intermediate level: At peripheral level: At private:
Laboratory scientists	Public lab % Clinical lab % Private lab % Other/Outside%	At central level: At intermediate level: At peripheral level: At private:
Postgraduate	Public lab % Clinical lab % Private lab % Other/Outside%	At central level: At intermediate level: At peripheral level: At private:

According to Ministry (M8):

According to laboratory managers (E2):

According to educational institutions (TG6-7):

According to students (S16):

2.b Planning of laboratory personnel

Note: here the questions are whether there is any planning mechanism of the numbers to be trained, and regarding the current shortages or surplus of laboratory staff in terms of type of staff and area.

Ministry of Health/Education (M6,M8,M9,M10,M13)**:**

Lab managers (E2,E8):

Educational institutions (TG7,8):

Students (S2,16):

Part 3. Curriculum of laboratory workers analysis sheet

Educational institutions

(TS 19) Is there one standardized education programme/curriculum for one type of personnel for all education institutes in the country? If no, what kind of differences are there in education programmes/curricula?

T1= Educational Institution 1 etc , please provide name of institution

3.a. Curriculum/education programme

	T1 Name:	T2 Name:	T3 Name:	T4 Name:	T5 Name:
What are the key qualifications for the graduates for which you provide the education?	TG 4				
Overall objectives	TS 1				
Entry requirements	TG 2				
Duration	TS 2				
Total study load	TS 3				
Who formulates and approves	TS 4				
Objectives reviewed and updated	TS 5				
Learning objectives for each course/module/topic	TS 6				
Alignment topics with overall objectives and module objectives	TS 7				

Alignment objectives-module objectives with learning and examination methods	TS 8				
End users: What do you see as the major gaps in the current education curricula of the various laboratory professionals?	E6				

Assessment by laboratory managers regarding newly graduates (E5a-d)

Answers: 1(very low)-5 (excellent)

Averages\ Newly graduate	Lab doctors (nr of respondents)	Lab scientists (nr of respondents)	Lab technicians (nr of respondents)	Lab assistants (nr of respondents)
1. Sufficient theoretical knowledge in laboratory?				
2. Sufficient practical skills in laboratory?				
3. Can they work in a team?				
4. Can they communicate well with different types of people?				
5. Can they organize their work well?				

6. Do they adhere to professional, including ethical standards?				
7. Do they continuously update themselves?				

Note: here key qualifications for the graduates for education (TG4), job descriptions (E3), key professional activities of newly graduates (E4a-d) and overall learning objectives (TS1) as well as assessment of newly graduates by laboratory managers (E5a-d) need to be compared and reviewed whether they are aligned with each other or not.

3.b. Teaching and learning methods

	T1	T2	T3	T4	T5
Division between in-class learning and self-learning	TS 9, S6 In class: .. % Self learning: .. %				
In-class learning: What % of time is for theory, and what % of time is for practical?	TS 10 Theory: ..% Practical: .. %				
For practical sessions: what is the mix of demonstration, group work, individual work (%)?	TS 11, S7, S9-10 Demonstration: ..% Group work:.. % Average size of group:.. Individual work: .. %				

For theory: what is the mix of lectures, group work, individual work (%)?	TS 12 Lectures ..% Supervised group work ..% Non-supervised group work ..% Individual work: ..%				
What are the teaching methods used?	TS 13, S6 Lectures Group work Case studies Exercises Role plays Student presentations Games Debates Practical sessions				
Is there any part of the education programme that is part of the curriculum but is provided outside of the institute (i.e. in a laboratory somewhere else)?	TS 14, S9				

If yes for TS 14: Is it explained to students and external teachers what the students should learn/be able to do?	TS 15, S 11				
If yes for TS 14: how is the education outside the school standardized?	TS 16, S10 *Supervision of students* … Are there *guidelines* on what student should perform /able to do at the end of their practice period? … Are there *requirements for supervisors* if they are not from school itself? … Are there *specific requirements for the laboratory?*				

3.c. Educational facilities

Score 1-4 where 1 - insufficient, 2 - sufficient,3 - good, 4 - excellent. Indicate separately if not available. Write down any comments in terms of quality of the facilities.

	T1	T2	T3	T4	T5
Are the teaching rooms adequate and enough?	TS 23-1				
Are chairs movable?	TS23-2				
Is the number of teaching rooms sufficient?	TS23-3				
Is the library adequate and up-to-date?	TS23-4				
Are the ICT facilities adequate and functioning?	TS23-5				
Are the computers adequate and functioning?	TS23-6				
Are the laboratory rooms adequate and enough?	TS23-7				
Is the laboratory equipment adequate and sufficient?	TS23-8 S8				
Is the equipment the same as the brands and types used in the routine public sector?	TS23-9				
Are consumables for all the practical work enough?	TS23-10				

How is the quality assurance for the facilities, including the laboratory, arranged?	TS24				

3.d. Quality

	T1	T2	T3	T4	T5
Is there a system for (anonymous) feedback from students?	TS20				
How is the feedback used?	TS21				
How is the quality assurance for each step of the curriculum arranged?	TS22				
Are there any issues with the level of the students that you recruit? I.e. deficient knowledge/skills?	TS25				
How is the quality assurance of teachers arranged?	TS31				
How is the quality assurance of examinations arranged?	TS41				

Ministry:

What is your impression of the quality of the graduates? Please specify for each type of graduate/school.	M11
What are the opinions of others about the quality of the graduates? (If necessary ask: employers? colleagues in Ministry? patients?) Please specify for each type of school.	M12
How is the collaboration between the education system and laboratory system organized to ensure that the needs (in terms of *quality*) of the laboratories are covered by the educational system? Please specify for each type of school.	M14

Students:

	1	2	3	4	5	6	7	8	9	10
Do you think you will have enough practical experience once you graduate?	S13									
Do you think you will have enough theoretical knowledge once you graduate?	S14									
Do you think this education will prepare you enough to work in a laboratory?	S15									

3.e. Teachers

	T1	T2	T3	T4	T5
What is the educational level of the teachers?	TS26				
What is the background of the teachers (expertise and teaching skills)	TS27				
What are the selection criteria for teachers?	TS28				
How do teachers keep their *teaching* skills and methods up to date?	TS29				
How do teachers keep their *technical* knowledge and skills up to date?	TS30				
How is the quality assurance of teachers arranged?	TS31				

3.f. Examinations

	T1	T2	T3	T4	T5
Who sets the exams?	TS32				
Who decides whether the exams are appropriate?	TS33				

Are examinations based on learning objectives?	TS34				
Who marks the examinations?	TS35				
Are all learning objectives covered during the examination? *Note for interviewers: the emphasis is here on ALL, probe to ask how they check that*	TS36				
What % of the examinations are based on knowledge and what % are based on skills, or on a combination?	TS37				
What kind of examination methods are used? • Written closed book • Written open book • Practical • Practical with observe by teacher - thesis	TS 38, S12				
Do theoretical examinations include test result interpretation?	TS39				
Are examination questions changed from year to year?	TS40				

Part 4. Collaboration between stakeholders

Here the different stakeholders are asked about their collaboration, for example the collaboration between the Ministry of Health and the Ministry of Education regarding educational requirements/policies/laws, quality and the collaboration between the ministries and the laboratories.

Laboratory managers:

Can you describe what is currently the mechanism to ensure that the education curricula are regularly updated in order to meet requirements you have for your laboratory staff?	E7a
How could this mechanism be improved?	E7b

Ministry:

How is the collaboration between the education system and laboratory system organized to ensure that the needs (in terms of *numbers*) of the laboratories are covered by the educational system? Please specify for each type of school.	M13
How is the collaboration between the education system and laboratory system organized to ensure that the needs (in terms of *quality*) of the laboratories are covered by the educational system? Please specify for each type of school.	M14
Are there any current initiatives to substantially reform the education and training programmes for new and /or existing laboratory personnel? Please specify for each type of school.	M15
Are there any current (national) educational reforms that will have major implications for the education of laboratory personnel?	M16

Are there any future plans for major changes for specific schools? Please specify for each type of school.	M17

Educational institutions:

How is the education programme/curriculum kept up to date?	TS17
Is there a system to obtain feedback from laboratory experts to check whether the education programme/curriculum meets the needs of actual laboratories? (and feedback from other stakeholders: alumni, Ministry of Health) If yes, how does it work?	TS18
Is there one standardized education programme/curriculum for one type of personnel for all education institutes in the country?	TS19

Part 5. Other suggestions:

Suggestions as forwarded by the managers (end-users), students and the ministry: E9, S17, M19.

Annex 4–3a: Health laboratory personnel educational system description (TG/TS)

Introduction

Well-functioning, sustainable laboratory services are an essential part of strong health systems and are crucial to improving public health. In addition, countries worldwide committed themselves to build national laboratory capacities for the detection of and response to public health events of international concern when they decided to engage in the International Health Regulations implementation process. Qualified laboratory workers are the most important laboratory resource and crucial partners in health care.

The World Health Organization aims to assist in strengthening national laboratory capacities. One of the approaches is focused on the national education system for laboratory personnel and the first step is this survey. This survey is addressed to educators, laboratory directors/managers, students and ministerial representatives with the goal to form an overall picture of current education and training for national laboratory personnel. The results of the survey will be discussed with all stakeholders at workshops. Review of the national education system by the stakeholders will help to identify strong and weak points of the system and plan steps for improvement of laboratory personnel education.

Questionnaire for education institutes/schools

Purpose of the interview

- To get an overview of the education curricula of the relevant educational institutes
- To identify whether available education programmes meet the needs of the country in quality and quantity
- To identify how the representatives of the relevant education institutes see the labour market for their graduates in their country

Guidelines for Interviewer

- Try to identify all schools/colleges/institutes/universities (further called "institute") involved in education of laboratory personnel of different levels (laboratory doctors, scientists, technicians, assistants and managers, post-graduate training).
- Try to interview representatives of each institute. These representatives must have a good overview of the whole curriculum offered to the given type of laboratory personnel, so for example the director or dean of the faculty or the person responsible for curriculum development.
- Try to interview representatives from the 2 largest institutes of each type.
- This questionnaire consists of 2 parts: 8 general questions (TG 1-8) and 41 specific questions (TS 1-41) that have to filled in for each type of education that is provided by the institute, see the answer to question TG1. This can thus be a maximum of 6 types of education. Make sure that there are enough copies of the TS questions to cover all types of education.
- Some countries provide education of laboratory technicians and assistants separately, other countries only train 1 type of cadre; either technicians or assistants. Please clarify that *before* the start of the interview.

- Please register the duration of each interview (write down the time of the start and the end) and the name of the institute.
- Explain to them overall purpose (see Introduction).
- Ask them whether their identity can be open or should be kept confidential and write this down. The name of the institution should however be open.
- For open questions, please write full answers, ask also for examples and explanation and write the answers down as full as possible.
- After the interview: Thank them again for answering.

Questionnaire

Date: Time start: Time finish:

Institute:

Anonymous: yes / no If no: name and position:

General questions

(7 questions)

Code	Question	Answer
TG1	What types of laboratory education, including specializations are provided by your institute?	Laboratory doctors Yes / no Laboratory scientists Yes / no Laboratory technicians Yes / no Laboratory assistants Yes / no Post graduate education Yes / no Laboratory manager Yes / no Specializations (if applicable): See note: please check beforehand whether there are lab technicians AND lab assistants or only 1 type of cadre.
TG 2	What are the entry requirements for students to be able to start the education? (Note: For TG2, and later: only to fill in for those type of graduates they provide the full curriculum for. I.e. sometimes institutions provide laboratory space for students from other schools, but that is not meant here)	Laboratory doctors Laboratory scientists Laboratory technicians Laboratory assistants Post graduate education

TG3	What is the duration of the curriculum (fill in where applicable for the given institute) for the graduates for who you provide the full/complete curriculum? In case of medical doctors: how many hours of lab training do they receive as part of their MD training and what topics?	Laboratory doctors … years Laboratory scientists … years Laboratory technicians … years Laboratory assistants … years Post graduate education Average …. days / weeks / months Specializations (if applicable) Hours of laboratory training for MD:… Topics pertaining to laboratory for MD:…		
TG4	How many students graduate each year, per type of graduate (for last 2 years where applicable) for who you provide the full curriculum?		Last year	Year before
		Lab doctors Lab scientists Lab technicians Lab assistants Post graduates	…….. …….. …….. …….. …….	…….. …….. …….. …….. ……..

TG5	What are the key qualifications for the graduates for which you provide the full curriculum? Note for the interviewers: sometimes these are called competencies or a professional profile, or end-qualifications (fill in or ask a copy and attach to the interview form)	Laboratory doctors Laboratory scientists Laboratory technicians Laboratory assistants	
Note for interviewer: QuestionsTG6-8 ask about the absorption capacity of the system for the graduates of the particular institute (they will be used for comparison with answers of other interviewed categories of people).			
TG6	Where are the graduates of your institute employed?	Public health laboratories Clinical laboratories Private laboratories Outside the laboratory system Other, namely Don't know	**% or proportion (total 100%)** ……. ……. ……. ……. …….
TG7	In your opinion, how many newly graduated personnel would be needed per year in the current situation for the whole laboratory system of the country?	Post graduates Lab doctors Lab scientists Lab technicians Lab assistants	**Number** ……. ……. ……. ……. …….

TG8	Are there staffing shortages/ excesses?	Laboratory doctors: Shortage – enough – excess Laboratory scientists: Shortage – enough – excess Laboratory technicians: Shortage – enough – excess Laboratory assistants: Shortage – enough – excess
	In certain areas or regions of the country If yes: where?	Yes / no

Specific questions

(41 questions)

Note for interviewer: these questions need to be filled in for each type of complete educational programme provided by the institute (see question TG1). Make sure to bring enough copies of this part of the questionnaire

Institute: ……

Education programme: ……..

TS1	Are there overall learning objectives of the education programme? If yes: can you please provide these?	Yes / no/ Partly
TS2	What is the duration of the education programme?	…….. days …….. weeks …….. months …….. years
TS3	What is the total study load of the education programme (including self-study and homework)?	Number of study hours per year/ per month/ per week: ……
TS4	Who formulates and approves the overall objectives of the curriculum?	

TS5	Are overall objectives regularly reviewed and updated? If yes, how often? When last time (year)? If no, when were the overall objectives last reviewed (year)?	
TS6	Are learning objectives formulated for each course or module/topic?	Yes / no / partly Remarks:

Note for interviewer: "Alignment" in the next questions means: do the objectives of the topics and modules cover the objectives of the programme as a whole? Or are there for example topics, which are not in the objectives, or general learning objectives, which are only partly or not covered by the topics or modules. The same holds for learning methods: if the learning objectives include skills to be learned, but the learning methods are only lecture, then there is no alignment. If the general learning objectives expect students to attain skills objectives, they need to be examined as a skills examination and not as a theory examination.		
TS7	How is the alignment of topics ensured with overall objectives and module objectives? *Note for the interviewers: if people say yes, please ask how they check that, and how often*	

TS8	How is the alignment of the objectives of the whole programme and individual modules with the learning methods and examination methods arranged? *Note for the interviewers: if people say yes, please ask how they check that, and how often*	

Note for interviewer: percentages are needed for general impression, no need to be exact.		
TS9	What is the division between in-class learning and self-learning for the whole programme?	In class: …….% of the time Self-learning: …….% of the time
TS10	In-class learning: What % of time is for theory, and what % of time is for practical	Theory: …….% Practical: …….%
TS11	For practical sessions: what is the mix of demonstration, group work, individual work (%)?	Demonstration: …….% Group work: …….% Individual work: …….%

TS12	For theory: what is the mix of lectures, group work, individual work (%)?	Lectures (teachers in front of class, students listen) Supervised group work (students work in groups on an assignment, supervised by a teacher Non-supervised group work (students work in groups on an assignment, in their own time and hand in the result as a group, work is not supervised by a teacher) Individual work	**Percentage (100% in total)** …….% ……% ……..% ……..%
TS13	What are the teaching methods used?	O Lectures O Group work O Case studies O Exercises O Role plays O Student presentations O Games O Debates O Practical sessions Other methods:	
TS14	Is there any part of the education programme that is part of the curriculum but is provided outside of the institute (i.e. in a laboratory somewhere else)?	Yes / no / partly If no, go to questions TS19 If yes or partly, give details:	

TS15	If yes for TS 14: Is it explained to students and external teachers what the students should learn/be able to do?	Yes / no / partly If yes or partly, give details:
TS16	If yes for TS 14: how is the education outside the school standardized?	*Supervision of students* O By laboratory personnel in the laboratory itself O By teachers stationed at the laboratory O By others, namely: Are there *guidelines* on what student should perform / able to do at the end of their practice period? Yes / no Are there *requirements for supervisors* if they are not from school itself? Yes / no Are there *specific requirements for the laboratory*, for example specific instruments/ techniques / consumables? Yes / no

TS17	How is the education programme/curriculum kept up to date?	
TS18	Is there a system to obtain feedback from laboratory experts to check whether the education programme/curriculum meets the needs of actual laboratories? (and feedback from other stakeholders: alumni, Ministry of Health) If yes, how does it work?	
TS19	Is there one standardized education programme/curriculum for one type of personnel for all education institutes in the country? If no, what kind of differences are there in education programmes/curricula?	Yes / no

TS20	Is there a system for (anonymous) feedback from students?	O Feedback on an individual class session O Feedback on a teacher O Feedback on teaching method O Feedback on a course/module O Feedback on a year studying O Feedback on the whole programme at graduation Is the feedback anonymous? Yes / no Remarks
Note for interviewer: for question TS21 it is important to probe: how is the feedback collected, compiled, who is responsible, any actions taken, any feedback given to those who provided the feedback? But do not ask these questions as closed questions		
TS21	How is the feedback used?	

Note for interviewer: question TS22 is a probing question, as in many countries there is no system in place. Questions may include • *Are there any quality criteria formulated for the different components of the curriculum? Probe: For learning objectives? For courses/topics? For teaching methods? For teachers? For exams?* • *How is ensured that these quality criteria are adhered to?* • *Who is responsible?* • *Is there a yearly report of the educational programme?* • *Is there an accreditation system of the educational programme by a ministry?* • *Is the programme accredited, by when?*		
TS22	How is the quality assurance for each step of the curriculum arranged?	

Education facilities		
Note for interviewer: Score 1-4 where 1 - insufficient, 2 - sufficient,3 - good, 4 - excellent. Indicate separately if not available. Write down any comments in terms of quality of the facilities.		
TS23-1	Are the teaching rooms adequate and enough?	1 – 2 – 3 – 4
TS23-2	Are chairs movable?	Yes / no
TS23-3	Is the number of teaching rooms sufficient?	1 – 2 – 3 – 4
TS23-4	Is the library adequate and up-to-date?	1 – 2 – 3 – 4
TS23-5	Are the ICT facilities adequate and functioning?	1 – 2 – 3 – 4
TS23-6	Are the computers adequate and functioning?	1 – 2 – 3 – 4 Average age: ……. years
TS23-7	Are the laboratory rooms adequate and enough?	1 – 2 – 3 – 4
TS23-8	Is the laboratory equipment adequate and sufficient?	1 – 2 – 3 – 4
TS23-9	Is the equipment the same as the brands and types used in the routine public sector?	Yes / no / partly / Don't know
TS23-10	Are consumables for all the practical work enough?	1 – 2 – 3 – 4

Note for interviewer: Question TS24 is a probing question again: Is there accreditation or certification? Are there any quality standards? How are they adhered to? Who is responsible?		
TS24	How is the quality assurance for the facilities, including the laboratory, arranged?	

Students		
TS25	Are there any issues with the level of the students that you recruit? I.e. deficient knowledge/skills?	Yes / no/ Partly Explanation:

Teachers		
TS26	What is the educational level of the teachers?	
TS27	What is the background of the teachers (expertise and teaching skills)	
TS28	What are the selection criteria for teachers?	
TS29	How do teachers keep their teaching skills and methods up to date?	

TS30	How do teachers keep their technical knowledge and skills up to date?	
TS31	How is the quality assurance of teachers arranged?	O Feedback from students O Feedback from colleagues O Providing/requiring continuous education

Examinations		
TS32	Who sets the exams?	
TS33	Who decides whether the exams are appropriate?	
TS34	Are examinations based on learning objectives?	Yes / no / partly
TS35	Who marks the examinations?	

TS36	Are all learning objectives covered during the examination? *Note for interviewers: the emphasis is here on ALL, probe to ask how they check that*		
TS37	What % of the examinations are based on knowledge and what % are based on skills, or on a combination?	Knowledge: …… % Skills: …… % Combination …… %,	
TS38	What kind of examination methods are used?	O Written-closed book O Written- open book O Practical O Practical with observation by teacher O Thesis O.. O..	**Percentage (total=100%)** …… % …… % …… % …… % …… % …… % …… %
TS39	Do theoretical examinations include test result interpretation?	Yes / no / partly	
TS40	Are examination questions changed from year to year?	Yes / no / partly	
Note for interviewer: Question TS41 is a probing question again: Are there any quality standards? How are they adhered to? Who is responsible?			
TS41	How is the quality assurance of examinations arranged?		

Thank you for answering these questions.

Annex 4–3b: Health laboratory personnel educational system description (M)

Introduction

Well-functioning, sustainable laboratory services are an essential part of strong health systems and are crucial to improving public health. In addition, countries worldwide committed themselves to build national laboratory capacities for the detection of and response to public health events of international concern when they decided to engage in the International Health Regulations implementation process. Qualified laboratory workers are the most important laboratory resource and crucial partners in health care.

The World Health Organization aims to assist in strengthening national laboratory capacities. One of the approaches is focused on the national education system for laboratory personnel and the first step is this survey. This survey is addressed to educators, laboratory directors/managers, students and ministerial representatives with the goal to form an overall picture of current education and training for national laboratory personnel. The results of the survey will be discussed with all stakeholders at workshops. Review of the national education system by the stakeholders will help to identify strong and weak points of the system and plan steps for improvement of laboratory personnel education.

Questionnaire for representatives of ministry of health, ministry of education

Purpose of the interview

- To get an overview of the current educational system for laboratory workers in the country
- To get an idea of education for laboratory personnel: whether there are any legal requirements and how it is organized
- To get an idea of the planning and market for laboratory workers in general and new graduates in particular

Guidelines for interviewers

- Laboratory education may fall under different ministries (Ministry of Health, Ministry of Education, …). Try to interview representatives from all involved ministries.
- Try to identify people who are in charge of the policy for educational programmes required for laboratory personnel and who are knowledgeable on the topic. People too high may not know enough, people too low might not be willing to make statements.
- Aim to interview enough people to gather required information. Conduct these interviews individually.
- In the interview questions are asked about different types of laboratory personnel (laboratory doctors, scientists, laboratory technicians, laboratory assistants. This may differ per country. Please adjust to your national situation
- Please register the duration of each interview (write down the time of the start and the end).
- Explain to them the overall purpose (see Introduction).
- Ask them whether their identity can be open or should be kept confidential, and write this down.
- For open questions, please write full answers, ask also for examples and explanation and write the answers down as full as possible.
- After the interview: Thank them again for answering.

Questions

(19 questions with sub-questions)

Date: Time start: Time finish:

Ministry:

Anonymous: yes / no If no: name and position:

	Question	Answer
M1	What types of education (types of degree/ diploma/certificate) are currently required for people in order to be able to work in medical laboratories in your country? Please probe	O Laboratory doctors O Scientists In what broad subject do they graduate (for example biology, chemistry, etc): O Graduates from technical colleges (laboratory technicians) O Laboratory assistants Other: O …… O …… O ……

Note for interviewer: in questions M2-M5 we ask for percentages. However, it is not necessary to know the exact percentages, it is more to get a general impression. So filling in 80% is fine if the interviewed person thinks it is somewhere between 70 and 90% or 50% if they indicate it is "about half".

M2	Which types of the laboratory personnel mentioned above (holders of each type of diploma) work in laboratories of *central* level? What is approximate percentage of each type in comparison with the total number of personnel?	**Type** O …… O …… O …… O …… O ……	**Percentage (Total 100%)** …..% …..% …..% …..% …..%

M3	Which types of the laboratory personnel mentioned above (holders of each type of diploma) work in laboratories of *intermediate* (oblast, regional) level? What is approximate percentage of each type in comparison with the total number of personnel?	**Type** O …… O …… O …… O …… O ……	**Percentage (Total 100%)** …..% …..% …..% …..% …..%
M4	Which types of the laboratory personnel mentioned above (holders of each type of diploma) work in laboratories of *peripheral* (rayon, district) level? What is approximate percentage of each type in comparison with the total number of personnel?	**Type** O …… O …… O …… O …… O ……	**Percentage (total 100%)** …..% …..% …..% …..% …..%
M5	Which types of the laboratory personnel mentioned above (holders of each type of diploma) work in *private* laboratories? What is approximate percentage of each type in comparison with the total number of personnel?	**Type** O …… O …… O …… O …… O ……	**Percentage (Total 100%)** …..% …..% …..% …..% …..%
For interviewer: often newly graduated laboratory personnel have to get a license or registration certificate. Try to identify this for each type of laboratory personnel			
M6	What are the legal requirements for registration/licensing of the different types of newly graduated laboratory personnel?		

M7	What are the overall numbers of students graduating each year? (if difficult, ask from each school)	Laboratory doctors Laboratory Scientists Graduates from technical colleges (laboratory technicians) Laboratory assistants	**Number** …… …… …… …… ……
For interviewer: there may be shortages or excesses of certain types of laboratory personnel or at certain levels or locations. Reasons (not due to production) may be migration in the country or to other countries, payment issues at certain levels, unattractiveness to work in rural areas etc. Do not give these examples, but keep them in mind to probe.			
M8	Are these numbers sufficient to cover the need in the country? (ask for any overproduction/any underproduction)	Yes/ no/ partly, explain for which type of laboratory personnel	
M9	Is there any planning mechanism for the production of the different type of laboratory personnel?	If yes: how?	
M 10	Is there a shortage or a surplus of certain types of laboratory personnel in your country?	Yes / no / partly If yes or partly: which types and for which types of laboratories?	

M11	What is your impression of the quality of the graduates? Please specify for each type of graduate/school.	
M12	What are the opinions of others about the quality of the graduates? (If necessary ask: employers? colleagues in Ministry? patients?) Please specify for each type of school.	
M13	How is the collaboration between the education system and laboratory system organized to ensure that the needs (in terms of *numbers*) of the laboratories are covered by the educational system? Please specify for each type of school.	

M14	How is the collaboration between the education system and laboratory system organized to ensure that the needs (in terms of *quality*) of the laboratories are covered by the educational system? Please specify for each type of school.	

For interviewer: Questions M15-17 are asked to learn details about current and planned education reforms and to see whether there is a need to harmonize different initiatives. Reforms may concern current curricula, completely new training programmes, training for new types of personnel or retraining of existing staff. New equipment, new training facilities, grants for changes etc. may also influence educational programmes. *Questions M15-16: sometimes there are initiatives that influence all education programmes in the country, for example accreditation, changes in Bachelor/Master systems etc. Sometimes there are initiatives that only influence the educational programme of the laboratory workers.*		
M15	Are there any current initiatives to substantially reform the education and training programmes for new and /or existing laboratory personnel? Please specify for each type of school.	
M16	Are there any current (national) educational reforms that will have major implications for the education of laboratory personnel?	
M17	Are there any future plans for major changes for specific schools? Please specify for each type of school.	

*For interviewer: many countries have a continuous education programme in which certain levels of laboratory personnel must follow **certain** courses or gather a **certain** number of points in order to be able to re-register within a **certain** period of time. It is important to identify each of the "**certain**" to get a good overview of the continuous education programme in a country.*		
M18	Please describe details of continuous education programmes which different types of laboratory workers are legally required to complete?	
M19	Is there anything which you would like to add in terms of the educational system of laboratory professionals?	

Thank you for answering these questions.

Annex 4–3c: Health laboratory personnel educational system description (E)

Introduction

Well-functioning, sustainable laboratory services are an essential part of strong health systems and are crucial to improving public health. In addition, countries worldwide committed themselves to build national laboratory capacities for the detection of and response to public health events of international concern when they decided to engage in the International Health Regulations implementation process. Qualified laboratory workers are the most important laboratory resource and crucial partners in health care.

The World Health Organization aims to assist in strengthening national laboratory capacities. One of the approaches is focused on the national education system for laboratory personnel and the first step is this survey. This survey is addressed to educators, laboratory directors/managers, students and ministerial representatives with the goal to form an overall picture of current education and training for national laboratory personnel. The results of the survey will be discussed with all stakeholders at workshops. Review of the national education system by the stakeholders will help to identify strong and weak points of the system and plan steps for improvement of laboratory personnel education.

Questionnaire for laboratory managers/directors

Purpose of the interview

- To find out how the laboratory managers/directors view the quality of newly graduated staff.
- To determine how the laboratory managers/directors see the labour market for laboratory staff in their country.

Guidelines for Interviewer

- Try to identify among the laboratory managers/directors those who hired newly graduated people within the last 5 years and have first-hand experience with recent graduates.
- Try to interview laboratory managers from different types of laboratories, for example clinical and public health, national, regional, local and private.
- Aim to interview 6-8 laboratory managers in total. Conduct these interviews individually.
- In the interview questions are asked about different types of laboratory personnel (laboratory doctors, scientists, laboratory technicians, laboratory assistants. This may differ per country. Please adjust to your national situation.
- Please register the duration of each interview (write down the time of the start and the end).
- Explain to them overall purpose (see Introduction).
- Ask them whether their identity can be open or should be kept confidential and write this down.
- For open questions, please write full answers, ask also for examples and explanation and write the answers down as full as possible.
- After the interview: Thank them again for answering.

Questions

(9 questions with sub-questions)

Date: Time start: Time finish:

Anonymous: yes / no If no: name and position:

#	Question	Answer	
For the interviewer: we are only asking about laboratory professionals, not about secretaries, cleaners, equipment servicing staff etc.			
E1	What types and numbers of laboratory personnel do you have in your laboratory?	**Type** O Laboratory doctors O Scientists O Laboratory technicians O Laboratory assistants O …… O …… O ……	**Number** ….. ….. ….. ….. ….. ….. …..
E2	Do you have sufficient staff? If no: for what positions do you currently have vacancies, how many (proportion?) and for how long?	Yes / no	
E3	Do you have job descriptions for your laboratory personnel?	No / Yes, for all positions / Yes for some of the positions If for some of the positions, please explain	

For the interviewer: Please ask E4 Questions for each type of personnel identified in Question E1.		
E4a	Can you state 3-5 key professional activities which the newly graduated laboratory assistants should be able to carry out without supervision?	1. 2. 3. 4. 5.
E4b	Can you state 3-5 key professional activities which the newly graduated laboratory technicians should be able to carry out without supervision?	1. 2. 3. 4. 5.
E4c	Can you state 3-5 key professional activities which the newly graduated laboratory doctors should be able to carry out without supervision?	1. 2. 3. 4. 5.

E4d	Can you state 3-5 key professional activities which the newly graduated scientists should be able to carry out without supervision?	1. 2. 3. 4. 5.

For the interviewer: Please ask question E5 for each type of personnel identified in Question E1. Question E5 asks about six different competencies required of medical professionals: communication, collaboration, organization, professional, continuous learning, advocator for laboratory services. *Ask them to choose the answer on a scale 1-5 with 1 being very low and 5 being excellent.*		
E5a	Do laboratory doctors fresh from school have: 8. Sufficient theoretical knowledge in laboratory? 9. Sufficient practical skills in laboratory? 10. Can they work in a team? 11. Can they communicate well with different types of people? 12. Can they organize their work well? 13. Do they adhere to professional, including ethical standards? 14. Do they continuously update themselves? Any other remarks?	1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 Remarks:

E5b	Do laboratory scientists fresh from school have: 1. Sufficient theoretical knowledge in laboratory? 2. Sufficient practical skills in laboratory? 3. Can they work in a team? 4. Can they communicate well with different types of people? 5. Can they organize their work well? 6. Do they adhere to professional, including ethical standards? 7. Do they continuously update themselves? Any other remarks?	1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 Remarks:

E5c	Do laboratory technicians fresh from school have: 1. Sufficient theoretical knowledge in laboratory? 2. Sufficient practical skills in laboratory? 3. Can they work in a team? 4. Can they communicate well with different types of people? 5. Can they organize their work well? 6. Do they adhere to professional, including ethical standards? 7. Do they continuously update themselves? Any other remarks?	1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 Remarks:

E5d	Do laboratory assistants fresh from school have: 1. Sufficient theoretical knowledge in laboratory? 2. Sufficient practical skills in laboratory? 3. Can they work in a team? 4. Can they communicate well with different types of people? 5. Can they organize their work well? 6. Do they adhere to professional, including ethical standards? 7. Do they continuously update themselves? Any other remarks?	1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 1 – 2 – 3 – 4 – 5 Remarks:

For the interviewer: Please ask Question E6 for each type of personnel identified in Question E1.		
E6	What do you see as the major gaps in the current education curricula of the various laboratory professionals?	Laboratory doctors: Laboratory scientists: Laboratory technicians: Laboratory assistants:
E7a	Can you describe what is currently the mechanism to ensure that the education curricula are regularly updated in order to meet requirements you have for your laboratory staff?	
E7b	How could this mechanism be improved?	

For the interviewer: Please ask Question E8 for each type of personnel identified in Question E1.		
E8	Are there staffing shortages/excesses? In certain areas or regions of the country If yes: where?	Laboratory doctors: Shortage – enough – excess Laboratory scientists: Shortage – enough – excess Laboratory technicians: Shortage – enough – excess Laboratory assistants: Shortage – enough – excess
E9	Do you have anything else to add, any suggestions regarding the education of laboratory professionals in your country?	

Thank you for answering these questions.

Annex 4–3d: Health laboratory personnel educational system description

Introduction

Well-functioning, sustainable laboratory services are an essential part of strong health systems and are crucial to improving public health. In addition, countries worldwide committed themselves to build national laboratory capacities for the detection of and response to public health events of international concern when they decided to engage in the International Health Regulations implementation process. Qualified laboratory workers are the most important laboratory resource and crucial partners in health care.

The World Health Organization aims to assist in strengthening national laboratory capacities. One of the approaches is focused on the national education system for laboratory personnel and the first step is this survey. This survey is addressed to educators, laboratory directors/managers, students and ministerial representatives with the goal to form an overall picture of current education and training for national laboratory personnel. The results of the survey will be discussed with all stakeholders at workshops. Review of the national education system by the stakeholders will help to identify strong and weak points of the system and plan steps for improvement of laboratory personnel education.

Questionnaire for students

Purpose of the interview

- To find out whether students have a sense of what the curriculum is leading to.
- To find out what students think about the teaching methods and examinations (independent comparison with what teachers say).
- To find out whether students go for practical training outside the training institution and whether there is an added value to this education (independent comparison with what teachers say).

Guidelines for Interviewer

- Try to find students from different levels of education (laboratory doctors, laboratory scientists, laboratory technicians, laboratory assistants) who are in the last year of their study and who are willing to talk and discuss.
- Try to interview about 8-10 students in total (2 per type of school). Conduct these interviews individually.
- Please register the duration of each interview (write down the time of the start and the end).
- Explain to them overall purpose (see Introduction).
- Explain to them that there are no wrong or right answers, we just want to get their opinion from them
- Explain that their identity will be kept confidential, we will not need to ask names, and names will not be mentioned on the form, nor in the report.
- For open questions, please write full answers, ask also for examples and write the answers down as full as possible.
- After the interview: Thank the student again for answering and state again that the answers will be treated confidentially.

Questions

(17 questions)

Date: Time start: Time finish:

#	Question	Answer
S1	What education are you following?	
S2	What is the reason you choose this education?	
S3	When did you start your education in this programme?	Month: Year:
S4	In which year of your education are you now?	
S5	When do you expect to graduate?	Month: Year:
For interviewer: all percentages for all the questions below can be rough estimates. It is more important to have an impression of the relative weight than exact numbers. So "about half" is 50% and "between 20 and 40%"is 30%.		

S6	What kind of teaching methods are used during your education? Probe What percentage of your education is given with this method?	**Method** O Lecture O Case study O Exercises O Games O Group work O Role play O Literature study O Research O Practical sessions in the lab O Self-study O ……	**Percentage (total =100%)** …… % …… % …… % …… % …… % …… % …… % …… % …… % …… % …… % …… %
S7	With regard to the practical sessions in the laboratory: what teaching methods are used?	**Method** O Demonstration O Group work Average size of group: ……. O Individual guided practice O …….	**Percentage (total=100%)** …… % …… % …… % …… %
S8	Is there enough equipment and consumables for your practical sessions?	Yes / no / Partially If no or partially: What is lacking?	
S9	Do you have practical sessions in laboratories that are outside your school?	Yes / no *(If No, go to S12)*	
S10	If yes to S9: How is your supervision arranged during these practical sessions?		

S11	If yes to S9: Is it clear what the purpose of your practical training outside the school is?	Clear to me /Clear to the laboratory supervisor /Clear to both /Not clear to any of us Purposes:	
S12	What kind of examination methods are used?	O Written-closed book O Written- open book O Practical O Practical with observation by teacher O Thesis O.. O..	**Percentage (total=100%)** …… % …… % …… % …… % …… % …… % …… %
S13	Do you think you will have enough practical experience once you graduate?	Yes / Partly / No Because:	
S14	Do you think you will have enough theoretical knowledge once you graduate?	Yes / Partly / No Because:	
S15	Do you think this education will prepare you enough to work in a laboratory?	Yes / no Because:	

S16	Do you think you will be able to find a job after you graduate? Please explain	Yes / no / Maybe Because:
S17	Do you have any suggestions how your education programme or the education of laboratory personnel in general be improved?	

Thank you for answering these questions.

Annex 5: Example lesson plan

Module title	
Date & Time	
Session title	
Duration	
Facilitator	
Rationale	
Learning objectives	At the end of this session, the participants will be able to: 1. 2. 3.
Educational methods	
Home assignment	
Required reading	
Recommended reading	

Annex 6a: Bloom's taxonomy

					Evaluation
					judge
					appraise
					evaluate
				Synthesis	rate
				compose	compare
				plan	revise
				propose	assess
			Analysis	design	estimate
			distinguish	formulate	
			analyse	arrange	
			differentiate	assemble	
		Application	appraise	collect	
		interpret	calculate	construct	
		apply	experiment	create	
		employ	test	set up	
	Comprehension	use	compare	organise	
	translate	demonstrate	contrast	manage	
	restate	dramatise	criticise	prepare	
	discuss	practice	diagram		
Knowledge	describe	illustrate	inspect		
define	recognise	operate	debate		
repeat	explain	schedule	Question		
record	express	sketch	relate		
list	identify		solve		
recall	locate		examine		
name	report		categorise		
relate	review				
underline	tell				

Annex 6b: Exercises – constructing good learning outcomes

- Exercise 1. Matching Bloom's level of cognitive activity with learning outcomes
- Exercise 2. Relating action verbs to Bloom's taxonomy
- Exercise 3. Learning outcomes for psychomotor domain
- Exercise 4. Learning outcomes for affective domain

Exercise 1: Matching Bloom's level of cognitive activity with learning outcomes

Bloom's levels of cognitive activity

1	**Knowledge**	recall; the ability to remember information
2	**Comprehension**	understanding; the ability to interpret and explain information
3	**Application**	the ability to use information in a new situation, to use knowledge and skills acquired in the classroom to solve problems and create new approaches
4	**Analysis**	the ability to break down information to understand its structure, to categorize, and to recognize patterns
5	**Evaluation**	the ability to make a judgment based upon evidence
6	**Synthesis**	the ability to bring together sets of information to create or invent solutions to problems, to illustrate relationships between parts of a whole

§ 1. 1 Match the following learning outcomes with the level of cognitive activity as described in the table above

1	Use WHO clinical staging definitions to assist in clinical decision making	
2	Evaluate the risk faced by health care workers of contracting HIV on the job	
3	Identify the three primary modes of HIV transmission	
4	Design an HIV-prevention counselling programme based on the Ministry of Health's counselling standards and guidelines	
5	Explain the difference between HIV and AIDS	
6	Outline effective strategies for managing nutrition complications in HIV-infected patients	

Exercise 2: Learning outcomes psychomotor domain

The psychomotor domain relates to the physical skills and/or performance of motor task according to standards of accuracy, rapidity, or smoothness.

Mastery of tasks progresses through:

- Perception: Observation
- Set: Mentally preparation
- Guided response
- Mechanism: Acting without assistance
- Complex overt response

§3. 1. Match the following learning outcomes with the level of psychomotor domain

Example objectives	
1	Demonstrate an IV insertion procedure safely and correctly on multiple patients under supervision
2	Describe the steps involved in conducting a rapid HIV test
3	Observe correct technique for conducting a pelvic exam
4	Conducts a thorough physical examination
5	Draw blood using universal precautions

§ 3.2. Match the following action verbs with the level of psychomotor domain as described in the table below.

Action verbs for objectives	
A	Complete, demonstrate, replicate, share, point out, break down, put together
B	Question, explore, consider outcomes, participate, tell, give examples, express confidence
C	Arrange, choose, conduct, construct, design, integrate, organize, perform, modify, refine, respond, vary
D	Observe, attend to, ask, describe, participate, answer
E	Arrange, choose, conduct, construct, design, integrate, organize, perform, modify, refine

Psychomotor domain	Action verbs for objectives	Example
Perception: observation of behaviours involved in completing a task		
Set: becoming mentally prepared to perform the task		

Guided response: the early stage in learning a complex skill that includes imitation, performing a task with assistance, and trial and error; adequacy of performance is achieved by practicing		
Mechanism: the intermediate stage in learning a complex skill; learned responses have become habitual, and the movements can be performed with some confidence and proficiency (acting without assistance)		
Complex overt response performing automatically with facility and habitually; fine tuning and perfection of the skill or technique		

Exercise 3: Learning outcomes affective domain

The affective domain relates to the emotional component of learning. It reflects changes/degrees of interest, attitudes and values.

- Interest – receiving – willing to listen
- Interest – responding – willing to participate
- Values – valuing – willing to be involved
- Values – valuing - be able to prioritize and organize values - willing to be an advocate
- Values – internalizing values – willing to change one's behaviour

§ 4.1. Match the following learning outcomes with the level of affective domain

	Example objectives
1	Integrate professional standards of patient confidentiality into personal life
2	Present clients with risk-reduction strategies appropriate to their needs
3	Ask open-ended questions to elicit information during a counselling session
4	Demonstrate ability to provide a client with an HIV-positive test result in a compassionate and supportive manner
5	Act objectively when solving problems

§ 4.2. Match the following action verbs with the level of affective domain as described in the table below.

Action verbs for objectives	
A	Ask, choose, describe, give, identify, locate, select
B	Complete, demonstrate, differentiate, explain, follow, initiate, join, justify, propose, read, share
C	Adhere, alter, arrange, combine, compare, defend, explain, integrate, modify
D	Act, display, influence, listen, modify, perform, propose, question, serve, solve, verify
E	Answer, assist, discuss, greet, help, participate, present, read, report, select, tell

Affective domain	Action verbs for objectives	Example
Receiving (willing to listen): awareness, attention to new information		
Responding (willing to participate): active pursuit of an interest, willingness to respond, motivation		
Valuing (willing to be involved): the worth or value a person attaches to a particular object, situation, or behaviour; reflects internalization of a set of values		
Organization (willing to be an advocate): the ability to prioritize and organize values		
Internalizing values (willing to change one's behaviour): the ability to act consistently and predictably according to a value system or consistent philosophy		

The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands
North Macedonia
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
Turkey
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization
Regional Office for Europe

UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark
Tel: +45 45 33 70 00 Fax: +45 45 33 70 01
Email: eucontact@who.int
Website: www.euro.who.int