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**Monitoring practical science in schools and colleges**

**Appendix 8: Higher Education Staff Telephone Interviews**

**Durham University**

**Prepared for the Gatsby Charitable Foundation and the Wellcome Trust**

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## 2 Higher Education staff telephone interview questions – Year 1

### Introduction:

This telephone interview is a follow up of the questionnaire you responded to about practical work in 1<sup>st</sup> year undergraduate Biological Science, Chemistry and Physics courses. The interview will last about 30 minutes, and the questions will ask you to elaborate on the questions in the questionnaire. We want to gain a deeper insight into what and how you teach in 1<sup>st</sup> year laboratory courses (including course based work which is carried out in the laboratory and fieldwork), and to know if anything is changing due to changes in pre-university education. We are interested in your reflections only on students who studied in the UK for their post-16 education.

### Questions:

1. Confirm details from the questionnaire
  - a. In which department(s) do you teach 1<sup>st</sup> year undergraduate laboratories?
  - b. What is your role within the(se) department(s) in relation to laboratory teaching?
2. What do you consider practical skills to be? (Provide an explanation that our definition is those skills important to doing the practical element of laboratories and fieldwork)
3. Why do you feel practical work is an important part of a science degree?

### Departmental related questions

4. Can you describe briefly how the laboratory teaching is organised in your department(s)?
5. Do/does the department(s) have learning targets or objectives for laboratory teaching, beyond or above the list of experiments students are supposed to do?
  - a. If yes: What are the main targets that students are expected to achieve?
  - b. If no: What do you personally regard as the main learning objectives in your laboratory courses?

### Student related questions

6. How well do you feel you know 1<sup>st</sup> year students' laboratory work; in terms of the specific exercises they do, the difficulties they face in their learning?
7. What do you see as the main challenges for 1<sup>st</sup> year students achieving the targets set by the department?
8. Reflecting on the answers you gave in the questionnaire relating to students' attitudes, skills and knowledge related to laboratory work when they come into the university
  - a. Please elaborate on what specific strengths and weaknesses you think 1<sup>st</sup> year students have in relation to their laboratory work?
  - b. What particular laboratory skills and knowledge would you like university students to have when they enter the university? How necessary is it that they arrive with them? (it may be good to look at the list of skills and knowledge in the written questionnaire, but allow the interviewee to elaborate first to reflect on main priorities)
  - c. What do you consider a good practical science experience for students to have before coming to university? How necessary is it that they arrive having had this?
  - d. Based on the qualifications they have achieved before starting university, what experiences/expectations do you have around the level of practical skills a student

- will have when they start university, e.g. does an top grade in A Level/IB/Scottish Highers imply that they will be good at practical work? Does an Extended Project Qualification (EPQ) mean a student will be excellent at practical work? What are your experiences of students who have additional or more applied qualifications like BTEC)?
- e. Do you have a process for selecting candidates on the basis of these qualifications or on the skills and knowledge related to laboratory work, and if so, how?
  - f. Considering the skills students require to carry out laboratory work and fieldwork on entry to university, where would you place practical experience and skill in order of importance compared to other skills (e.g. communication) and knowledge (conceptual)?
9. If there is time: Is there much difference among students in terms of the attitude, skills and/or knowledge they bring to laboratory courses from their pre-university education?
- a. What do you think create the biggest differences among students? For example, School type e.g. independent schools versus state schools; teaching the students received within the school; examining board that gives the qualification; whether they sat any additional qualifications e.g. EPQ; the student's nationality or country in which they went to school (e.g. England, Northern Ireland, Scotland, Wales, international etc.)?
  - b. Is it possible to give evidence that these differences are important?
10. Do you find students' attitudes, skills and/or knowledge related to laboratory work when they come into the university have changed over the years?
- a. If yes: What has changed and in what particular ways?
  - b. If yes: Do you see any reasons for these changes?
  - c. If no: Do you find laboratory skills and knowledge more stable than their theoretical skills and knowledge? Why do you think that is?
11. Please elaborate on your answers in the questionnaire to what changes or adjustments to **the content** of laboratory courses your department made over the last year to accommodate for changes that have happened in schools.
- a. If they answered that there have been changes, can they give examples?
  - b. If they answered no, has the content in the laboratory courses changed for any other reasons?
  - c. Are there particular experiments you used to do, but you no longer feel appropriate for 1<sup>st</sup> year students?
  - d. Are there particular experiments today's 1<sup>st</sup> year students today are better at doing than 1<sup>st</sup> year students some years ago?
12. Has your department changed or adjusted **the pedagogy** of laboratory courses (i.e. how you teach laboratory courses) over the last year to accommodate for changes that have happened in schools, or for any other reasons?
- a. If yes, please give some examples of the changes you have made.
  - b. If no, what will you describe as typical features of the laboratory teaching you offer 1<sup>st</sup> year students (that is, in terms of **how** they are taught)?

13. Are there any other experiences or information you think are relevant to mention for a study that aims to understand changes to practical work in secondary and Higher Education science teaching?

Thank you for participating in the interview!

### 3 Higher Education staff telephone interview questions – Year 2

#### Introduction:

This telephone interview follows up the questionnaire to which you responded about practical work in 1<sup>st</sup> year undergraduate Biological Sciences, Chemistry and Physics courses. The interview will last about 30 minutes. The questions ask for elaboration on the topics probed in the questionnaire. We want to gain a deeper insight into what and how you teach 1<sup>st</sup> year laboratory courses (including course based work carried out in the laboratory and fieldwork), focusing on any changes arising from developments in pre-university education. We are interested in your reflections only on students who completed their post-16 education in the UK.

#### Questions:

1. Confirm details from the questionnaire
  - a. In which department(s) do you teach 1<sup>st</sup> year undergraduate laboratories?
  - b. What is your role within the(se) department(s) in relation to laboratory teaching?
  - c. Has your role changed in the last twelve months? If so, how?
2. What do you consider practical skills to be? (Provide an explanation that our definition is those skills important to doing the practical element of laboratories and fieldwork).
3. Why do you feel practical work is an important part of a science degree?
4. Do you think that the role practical work plays within the science degree on which you teach is changing in any way? What is the nature and cause of these changes in your opinion?

#### Departmental related questions

5. Can you describe briefly how the laboratory teaching is organised in your department(s)?
6. Do/does the department(s) have learning outcomes for laboratory teaching, beyond or above the list of experiments students are supposed to do?
  - a. If yes: What are the main learning outcomes that students are expected to achieve?
  - b. If no: What do you personally regard as the main learning objectives in your laboratory courses?
  - c. Have these learning targets or outcomes changed in the last twelve months? If so, how? And why have these changes been made?

#### Student related questions

7. How well do you feel you know 1<sup>st</sup> year students' laboratory work; in terms of the specific exercises they do, the difficulties they face in their learning?
8. What are the main challenges students face in achieving the learning outcomes for 1<sup>st</sup> year practical work?

9. Would you say that the challenges 1<sup>st</sup> year undergraduates face are more or less difficult than twelve months ago? If so, why?
10. Reflecting on the answers you gave in the questionnaire relating to students' attitudes, skills and knowledge related to laboratory work when they come into the university
  - a. Please elaborate on the specific strengths and weaknesses you think 1<sup>st</sup> year students have in relation to their laboratory work.
  - b. What particular laboratory skills and knowledge would you like university students to have when they enter the university? How necessary is it that they arrive with them? (It may be good to look at the list of skills and knowledge in the written questionnaire, but allow the interviewee to elaborate first to reflect on main priorities.)
  - c. What do you consider a good practical science experience for students to have before coming to university? How necessary is it that they arrive having had this?
  - d. Based on the qualifications they have achieved before starting university, what experiences/expectations do you have around the level of practical skills a student will have when they start university, e.g. does an top grade in A Level/IB/Scottish Highers imply that they will be good at practical work? Does an Extended Project Qualification (EPQ) mean a student will be excellent at practical work? What are your experiences of students who have additional or more applied qualifications like BTEC)?
  - e. Do you have a process for selecting candidates on the basis of these qualifications or on the skills and knowledge related to laboratory work, and if so, how?
  - f. Considering the skills students require for carrying out laboratory work and fieldwork on entry to university, where would you place practical experience and skill in order of importance compared to other skills (e.g. communication) and knowledge (conceptual)?
11. In what ways do students differ in terms of the attitude, skills and/or knowledge they bring to laboratory courses from their pre-university education?
  - a. What do you think creates the biggest differences among students? For example, school type e.g. independent schools versus state schools; teaching the students received within the school; the examining board / specification students have studied; whether students hold any additional qualifications e.g. EPQ; the student's nationality or country in which they went to school (e.g. England, Northern Ireland, Scotland, Wales, international, etc.)?
  - b. Do you have any evidence that these differences are significant? In what ways do these differences impact on students' ability to conduct practical work at university?
12. Have students' attitudes, skills and/or knowledge related to laboratory work when they come into the university changed over the last year?
  - a. If yes: What has changed and in what particular ways?
  - b. If yes: Do you see any reasons for these changes?

- c. If no: Do you find laboratory skills and knowledge more stable than their theoretical skills and knowledge? Why do you think that is?
  - d. Have any specific changes occurred in the last twelve months? If so, what are these?
13. Please elaborate on your answers in the questionnaire to what changes or adjustments to **the content** of laboratory courses your department made over the last year to accommodate for changes that have happened in schools.
- a. If they answered that there have been changes, can they give examples?
  - b. If they answered no, has the content in the laboratory courses changed for any other reasons?
  - c. Are there particular experiments you used to do, but you no longer feel appropriate for 1<sup>st</sup> year students?
  - d. Are there particular experiments today's 1<sup>st</sup> year students today are better at doing than 1<sup>st</sup> year students last year?
  - e. Are there any specific experiments that students no longer have the skills and/ knowledge to carry out? What are these?
14. Has your department changed or adjusted **the pedagogy** of laboratory courses (i.e. how you teach laboratory courses) over the last year to accommodate for changes that have happened in schools, or for any other reasons?
- a. If yes, please give some examples of the changes you have made.
  - b. If no, what will you describe as typical features of the laboratory teaching you offer 1<sup>st</sup> year students (that is, in terms of **how** they are taught)?
15. How much do you know about the changes that are going on in pre-university education related to practical science?
16. How do you view the changes that are taking place in pre-university education, i.e. positively/negatively/neutrally?
17. Are there any other experiences or information you think are relevant to mention for a study that aims to understand changes to practical work in secondary and higher education science teaching?

Thank you for participating in the interview!

## 4 Higher Education staff telephone interview questions – Year 3

### Introduction:

This telephone interview follows up the questionnaire to which you responded about practical work in 1<sup>st</sup> year undergraduate Biological Sciences, Chemistry and Physics courses. The interview will last about 30 minutes. The questions ask for elaboration on the topics probed in the questionnaire. We want to gain a deeper insight into what and how you teach 1<sup>st</sup> year laboratory courses (including course based work carried out in the laboratory and fieldwork), focusing on any changes arising from developments in pre-university education. **We are interested in your reflections only on students who completed their post-16 education in the UK, and especially this year on students who completed the new A level curriculum in England.**

### Questions:

1. Confirm details from the questionnaire
  - a. In which department(s) do you teach 1<sup>st</sup> year undergraduate laboratories?
  - b. What is your role within the(se) department(s) in relation to laboratory teaching?
  - c. Has your role changed in the last twelve months? If so, how?
2. Do you think that the role practical work plays within the science degree on which you teach is changing in any way? What is the nature and cause of these changes in your opinion?

### Departmental related questions

3. Can you describe briefly how the laboratory teaching is organised in your department(s)?
4. Do/does the department(s) have learning outcomes for laboratory teaching, beyond or above the list of experiments students are supposed to do?
  - a. If yes: What are the main learning outcomes that students are expected to achieve?
  - b. If no: What do you personally regard as the main learning objectives in your laboratory courses?
  - c. Have these learning targets or outcomes changed in the last twelve months? If so, how? And why have these changes been made?

### Student related questions

5. How well do you feel you know 1<sup>st</sup> year students' laboratory work; in terms of the specific exercises they do, the difficulties they face in their learning?
6. What are the main challenges students face in achieving the learning outcomes for 1<sup>st</sup> year practical work?
7. Would you say that the challenges 1<sup>st</sup> year undergraduates face are more or less difficult than twelve months ago? If so, why?
8. Reflecting on the answers you gave in the questionnaire relating to students' attitudes, skills and knowledge related to laboratory work when they come into the university

- a. Please elaborate on the specific strengths and weaknesses you think 1<sup>st</sup> year students have in relation to their laboratory work.
  - b. What particular laboratory skills and knowledge would you like university students to have when they enter the university? How necessary is it that they arrive with them? (It may be good to look at the list of skills and knowledge in the written questionnaire, but allow the interviewee to elaborate first to reflect on main priorities.)
    - i. (If they have said that it is not necessary to have any specific skills or knowledge on arrival, probe a little deeper) Although you are happy for/able to cope with students arriving without specific skills and knowledge, are there any other attributes that you would like to see from them to enable good practical work when they arrive e.g. confidence to have a go etc.
  - c. Based on the qualifications they have achieved before starting university, what experiences/expectations do you have around the level of practical skills a student will have when they start university, e.g. does an top grade in A Level [or Scottish Highers] imply that they will be good at practical work?
  - d. Have you any students on the course who have taken A levels but have not passed the practical endorsement? If so, do the students that have passed the practical endorsement have better practical skills?
  - e. Does an Extended Project Qualification (EPQ) mean a student will be excellent at practical work? What are your experiences of students who have additional or more applied qualifications like BTEC)? Do you have a process for selecting candidates on the basis of these qualifications or on the skills and knowledge related to laboratory work, and if so, how?
  - f. Considering the skills students require for carrying out laboratory work and fieldwork on entry to university, where would you place practical experience and skill in order of importance compared to other skills (e.g. communication) and knowledge (conceptual)?
9. Have students' attitudes, skills and/or knowledge related to laboratory work when they come into the university changed over the last year?
- a. If yes: What has changed and in what particular ways?
  - b. If yes: Do you see any reasons for these changes?
  - c. If no: Do you find laboratory skills and knowledge more stable than their theoretical skills and knowledge? Why do you think that is?
  - d. Have your entry requirements changed in the past year (or recent years)? If so, has this had an impact on students' practical skills and ability? Or any other impact on teaching and learning?
10. In what ways do students differ in terms of the attitude, skills and/or knowledge they bring to laboratory courses from their pre-university education?
- a. What do you think creates the biggest differences among students? For example, school type e.g. teaching the students received within the school; the examining

board / specification students have studied; whether students hold any additional qualifications e.g. EPQ; the student's nationality or country in which they went to school (e.g. England, Northern Ireland, Scotland, Wales, international, etc.); independent schools versus state schools?

- b. Do you have any evidence that these differences are significant? In what ways do these differences impact on students' ability to conduct practical work at university?
11. Please elaborate on your answers in the questionnaire to what changes or adjustments to **the content** of laboratory courses your department made over the last year to accommodate for changes that have happened in schools.
  - a. If they answered that there have been changes, can they give examples?
  - b. If they answered no, has the content in the laboratory courses changed for any other reasons?
  - c. Are there particular experiments you used to do, but you no longer feel appropriate for 1<sup>st</sup> year students?
  - d. Are there particular experiments today's 1<sup>st</sup> year students today are better at doing than 1<sup>st</sup> year students last year?
  - e. Are there any specific experiments that students no longer have the skills and/ knowledge to carry out? What are these?
12. Has your department changed or adjusted **the pedagogy** of laboratory courses (i.e. how you teach laboratory courses) over the last year to accommodate for changes that have happened in schools, or for any other reasons?
  - a. If yes, please give some examples of the changes you have made.
  - b. If no, what will you describe as typical features of the laboratory teaching you offer 1<sup>st</sup> year students (that is, in terms of **how** they are taught)?
13. How much do you know about the changes that are going on in pre-university education related to practical science?
14. How do you view the changes that are taking place in pre-university education, i.e. positively/negatively/neutrally?
15. Is there anything that you think should be introduced/removed or would like to see happening in pre-university education to improve students' readiness for carrying out practical work in science at university?
16. Are there any other experiences or information you think are relevant to mention for a study that aims to understand changes to practical work in secondary and higher education science teaching?

Thank you for participating in the interview!

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