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STUDY AND
COMMUNICATION
SKILLS FOR THE
CHEMICAL
SCIENCES

2ND EDITION

TINA OVERTON,
STUART JOHNSON,
AND JON SCOTT



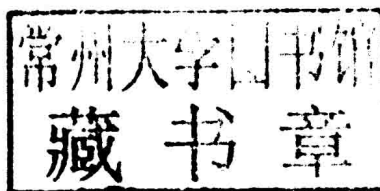
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OXFORD
UNIVERSITY PRESS

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Great Clarendon Street, Oxford, OX2 6DP,
United Kingdom

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First edition 2011

Impression: 1

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Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10016, United States of America

British Library Cataloguing in Publication Data

Data available

Library of Congress Control Number: 2014958947

ISBN 978-0-19-870869-8

Printed in Great Britain by
Ashford Colour Press Ltd, Gosport, Hampshire

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the Chemical Sciences

Preface

STUDY SKILLS AND CAREER PLANNING

The transition from school or college to university is a very significant life event: for all students it marks the beginning of the next stage in their educational career and, for many, it may be their first experience of living away from home for any length of time. This transition, therefore, is associated with a whole range of new experiences in social and academic terms. Among these is a marked change in learning and teaching styles, with an expectation of increasing independence as a learner and development of a more mature, critical approach to the subject. Meeting the challenges posed by these changes requires the development of new skills in many areas of life, not least in the areas of study and communication. If you can develop effective study and communication skills early in your university career, you will facilitate your overall learning and help maximize your academic performance.

This book arose from many years of experience in developing and delivering courses in study skills, communication skills, and career planning in the Department of Chemistry at the University of Hull and in the School of Biological Sciences at the University of Leicester. The structure of the book and its format are based on our experiences of delivering these courses, in terms of recognizing where students experience difficulty in developing these skills and in learning from those students better ways of teaching and providing support for their learning. In this second edition we have expanded the coverage of employability skills, recognizing the need for graduates to be able to sell themselves in an increasingly competitive employment market. We hope that the future generations of students will be able to benefit from this guidance and we also look forward to learning more about the ways in which skills can best be developed.

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Acknowledgements

We would like to thank the students in the Department of Chemistry at the University of Hull and in the School of Biological Sciences at the University of Leicester who have helped to shape our work and, over the years, have experienced the evolution of our courses in Study and Communication Skills.

Our thanks also go to Alice Roberts and Oxford University Press for their support throughout the project and for not harassing us too much when our timings slipped.

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1

Why are study and communication skills important?

➔ Introduction

As the title suggests, this book explores the key study and communication skills that are needed by chemistry students beyond school level. This means if you're studying, or about to study, chemistry this book can help. As you may have already gleaned from the contents pages, this book addresses a range of important topics, including:

- making the most of lectures;
- getting the most out of tutorials and group work;
- maximizing the skills developed through practical work;
- working with different information sources;
- choosing the right writing style;
- writing essays;
- writing practical reports;
- working in tutorials and groups;
- avoiding plagiarism;
- preparing scientific presentations;
- delivering scientific presentations;
- creating academic posters;
- using feedback;
- getting the most out of revision;
- getting the most out of exams;
- career planning;
- getting your first graduate position.

We have written this book to help you in all of these areas and you may wish to work through them one by one. Alternatively, however, it may be that you have a specific issue that you need help with and so want to skip directly to the relevant chapter. Either approach is fine: we have written the book so that it makes sense when read as a whole text or as individual chapters. It is a good idea to read this chapter first though, as it helps set the scene.

Good study and communication skills are vital if you are going to do well at university; they will help you to study efficiently and effectively and so perform to the best of your ability in your chosen area of chemistry. However, good study and communication skills

aren't only useful for studying for your course; the kinds of skills you need to develop to do well in your chosen field of study have many parallels with the kinds of skills that will be useful throughout your career. Being able to research a subject, construct an argument, write a report, present information, manage your time, and plan your own development are all skills that are highly sought after by most, if not all, employers. So we hope this book won't just help you to do better in your degree, but will also help you to do well beyond university.

Incidentally, in this chapter we mainly talk about studying for a degree at university. However, this book is equally useful if you're doing another kind of chemistry course, whether at university or college.

1.1 Being a student in Higher Education

Clearly, if you have got as far as getting a place at university you must be good at studying. Also, you were probably taught about study skills at school or college, and you will have certainly developed your own study skills during your time there. So why do you need to read this book? The main reason is this: studying for a degree at university is different from studying at pre-university level. There are numerous ways in which it's different. We discuss some important ones here.

The major change between school or college and higher education is that you are expected to be much more autonomous in your learning and get on with work for yourself. Some students find this new freedom exciting; others let it go to their heads and come a cropper. Your lecturers will provide the general framework for the subject areas through lectures, tutorials, laboratory sessions, workshops, and coursework, and may provide additional support by recommending additional reading and providing you with feedback. Ultimately, your success depends on you making the most of the learning opportunities presented to you. You will find that your lecturers won't chase you up as much as at school, either in terms of your attendance or making sure you meet deadlines in your work. You will be expected to undertake much more self-directed study and so will need to learn to **manage your time** well (Section 1.3.1).

Time management is something that new students find very challenging. Personal time management is a skill. It involves identifying priorities and allocating study time accordingly. You need to be aware of your own strengths and weaknesses too. Do you work better in the day or at night? When are you least distracted by family or friends? Do you find you work better with a friend? Good time management means having the right attitude and an organized outlook. Here are a few things that can keep you on track:

- You should realize that being a full-time student is a full-time job. That means you should be spending around 40 hours a week on your studies.
- Draw up a fixed weekly schedule identifying realistic and manageable goals for your work.
- Use electronic scheduling and reminders available on your mobile device.
- Always start with the most important or urgent task.
- Work at a time that suits you, but make it a regular time.

- Avoid interruptions. Ignore the phone, email, etc. until you are finished.
- Avoid 'time thieves', those activities that gobble up your time almost without you realizing it.
- Don't think that untimetabled hours are 'free' time. Use them!
- Use those gaps between lectures to work in the library rather than drink more coffee.

Try this: Managing your time

Draw up a schedule for the coming week. Include all timetabled activities and previous commitments. Then schedule in blocks of time for studying, socializing, and carrying out domestic chores.

Different people learn in different ways. These can depend on personality, previous experiences, motivations etc. It may help you to identify your own preferred way of learning style and to try to broaden that so that you can learn effectively in a wider range of situations. It is also possible to learn at several different 'levels'. This may depend on your study skills or purpose for learning. The levels can be arranged according to the amount of cognitive processing that they require.

1. Memorizing facts.
2. Understanding the meaning of materials.
3. Applying material learned to new situations.
4. Breaking down material learned in order to understand its structure.
5. Putting together material to form new models or arguments.
6. Evaluating the value of material, weighing up evidence, etc.

It is quite possible to perform reasonably well in examinations by simply memorizing facts and regurgitating them. This would be level 1 and we would describe that as 'surface learning'. Information learned in this way is quickly forgotten. The purpose of higher education is to produce graduates who are skilled analytical, **critical thinkers** (Section 1.3.2). These intellectual skills are developed as you work at levels 5 and 6. Learning of this type is often referred to as 'deep learning'. During your time in HE you should feel that you are moving through the levels from 'surface' learning to 'deep' learning and developing your intellectual and thinking skills.

Studying at university requires you to be more self-reflective about your ability and performance than you were at school in order to adapt and develop your current skills to better suit an undergraduate level of study. So you will need to learn to **develop yourself** (Section 1.3.3). Thinking about developing yourself whilst during your undergraduate studies will pay dividends when you come to apply for your first graduate position as you should have been developing a range of transferable skills that all employers look for.

Your experience in the classroom at school or college will probably have been very different to what you will experience over your time at university. To begin with you are likely to be in much larger groups for your lectures. Depending on your institution and the type of course you could be one of a cohort of several hundred students. Obviously, in this situation it is

not possible to have the close relationship with your lecturer that you might have had with a teacher at school. Universities will, however, ensure that you experience being taught in smaller groups, often in workshops or in small group tutorials. Workshops may be used for problem classes, skills development activities, group projects, problem-based and enquiry-based activities. The laboratory experience in university is likely to be more demanding than that which you experienced previously, not least in that you will spend many more hours in the laboratory environment. You are also likely to take part in project work, either as part of a group or individually. All these learning opportunities are discussed in greater detail throughout the book.

Studying at university is, for most, a more challenging experience than school or college. This book will help you to meet those challenges and assist you in making the transition to become an accomplished undergraduate student. This chapter will focus in on the above differences to highlight what we consider to be the foundational (or fundamental) skills you need to develop (and keep in mind) throughout your studies.

1.2 The contextual nature of skills: making the transition to undergraduate study

Skills are contextual. By this we mean that skills are learnt in a particular context and the way you apply them is specific to that context. For example, when you learn to drive a car you learn in a certain way—usually with a driving instructor sitting next to you, in a car that's familiar to you, and receiving instruction on what to do. But just because someone has learnt to drive, it doesn't mean the person is capable of driving well in any and every situation. The chances are, initially at least, that the driving skills will be limited to a similar context to that within which they were originally learnt. Read through the following scenario to see what we mean.

Imagine a friend of yours has spent the last few months learning to drive and they have just passed their test, passing with only two minor faults.

- If they offered you a lift, in a similar car to the one they had learnt in, would you feel safe catching a lift with them?
- If they offered you a lift, in a similar car to the one they had learnt in, but it was night time, would you feel safe catching a lift with them?
- If they offered you a lift, in a similar car to the one they had learnt in, but they were going to drive on a busy motorway, would you feel safe catching a lift with them?
- If they offered you a lift, but they were driving an articulated lorry, would you feel safe catching a lift with them?

The chances are you would probably be more reluctant to accept a lift the more unusual the context became. This is because the more unfamiliar a context is to someone the more difficult it is to perform well in that context.

There are clear parallels between this example and making the transition to undergraduate study, which we are sure you will have spotted. You already have study and communication skills, probably ones that have served you well so far, but as we have seen, studying for a degree at university is different from studying at pre-university level. Your skills will therefore need adapting and developing to fit the new situation you are encountering. The good news

is that skills can be transferred from one context to another, so the skills that you have developed so far are by no means wasted. In fact, they provide a very useful starting point.

1.3 Foundational skills

As we mentioned earlier, the important differences between studying at pre-university and at undergraduate level reveal three foundational skills that are vital for students who want to perform well during their degree: managing your time, thinking critically, and developing yourself. These aren't the only skills—and subsequent chapters highlight many others—but they do underpin the ones that follow and so are worth drawing to your attention at this early stage.

1.3.1 Manage your time well

Many students, on nearing the end of their degree course, wish that they could have their time again. This is often because they feel that, given another go, they could do better. The reasons for thinking they could do better may be quite diverse, but common to many of them will be the notion that if they had managed their time more effectively they would have been able to perform more effectively, and get a better degree. Therefore, managing your time well is crucial to performing well at university. There will be many demands on your time—social as well as academic—and you will have more autonomy about how you choose to spend your time compared with school or college. It's important, therefore, that you learn to allocate your time appropriately. This is one of those things that is easier to say than to actually do; in theory it's straightforward, in practice it's difficult.

We have identified the need to manage your time well as a foundational skill because it is necessary for performing well in a wide range of academic tasks, but that doesn't mean we are going to deal with it in an abstract way—with a chapter just about time management, for example. Instead we address it in what we think is a much more helpful way: giving you advice about how to manage your time wherever it is relevant, in context—for example, when writing an essay or assignment, giving a presentation, or preparing for exams. As such, effective time management is a theme that occurs throughout the book, so look out for these sections in the chapters that follow.

1.3.2 Think critically

The second foundational skill that we want to draw your attention to in this opening chapter is the need to learn to think critically. Critical thinking is common to all academic endeavours and so it is important to understand what it is. Many people think about 'critical' as a negative term, and perhaps words like 'unfavourable', 'fault-finding', or even 'unkind' spring to mind. Being critical is, however, much more than this. If you have ever read a review of a film, book, play, or concert, the review will have been written by a 'critic': someone whose professional job is to be critical in its full sense. For example, the critique of the performance of a play comments on all sorts of aspects of that play, including the quality of the performances of the individual actors, the way the stage was designed, the lighting, and so on. Thus, the critic may have written in glowing terms about the leading lady but felt that the supporting cast was not

up to the job. In this context being critical may mean being very positive and negative simultaneously, about different aspects of the same thing. However, it is important to note that this kind of criticism is subjective: one critic's view of the play may be very different from another's.

In the academic sense, the word 'critical' also doesn't have specifically negative connotations. In fact, in an academic context, being critical is a good thing and is something to be encouraged. However, there is one key difference between thinking critically in scientific terms and in terms of reviewing a play: in science, the critical thinking should be undertaken *objectively*. For example, if you are comparing two theories, you should compare the ideas being presented and evaluate the weight of evidence supporting them, using this evaluation to decide which is most tenable. You should approach this evaluation from a neutral (impartial) viewpoint: not looking for something to be right or wrong because you *think* it should be, but because the available evidence indicates it to be so. Critical thinking is therefore a process that requires the evaluation of evidence to come to a conclusion that is supported by the outcome of experiments or observations: it is an intellectual exercise that is fundamental to the way in which science works and develops: the basis of scientific method.

As with managing your time, this is not a book primarily about thinking critically. Rather we will address what it means to think critically when undertaking particular academic tasks—for example, being involved in lectures or tutorials, or when researching information for an essay or presentation. Look out for these sections in the chapters that follow.

1.3.3 Develop yourself

The third and final foundational skill that we have identified is the need to learn to develop yourself. This won't be an unusual concept to you as doubtless you will have been encouraged to engage in some kind of personal development planning at school. To make the transition from pre-university to undergraduate level, however, you will need to continue to develop yourself. Many universities will have a personal development planning scheme that you will be encouraged to take part in. Such schemes are designed to help you in two ways: to improve your academic performance, and to help you make plans for what you will do once you have graduated. It is a process of continuous improvement: thinking about and reflecting on what you have done in the past, and learning from this experience to influence in a positive way what you do in the future (asking yourself questions like 'what worked well?', 'what didn't go as planned?', 'how can I make sure that the things that didn't work well work better next time?').

Regardless of the format of the system you use, the important thing is that you reflect on your progress (to identify where you are doing well and where you need to improve) and make plans for your future development. You will have numerous opportunities for reflection, including:

- feedback on coursework;
- feedback on exams;
- conversations with your lecturers;
- conversations with your personal tutor;
- conversations with friends;
- time by yourself thinking.