

# Learning Needs Analysis for Researcher Skills in the Experimental Sciences

## Information for students, researchers and tutors

1. This LNA questionnaire, and each related questionnaire for different subject areas, was produced specifically for use by research students and I have used it in various forms with them since 2003. It has not been validated in any way, but the response from research students who have used it repeatedly during their degree programme is that it has been useful tool for reflection and planning. (The LNA has evolved with the helpful comment of the students who have used it).
2. I am very pleased to make it available to colleagues in academic institutions for their personal use either in assessing their own learning needs or for the use of their students and researchers.
3. You may reproduce it freely for academic purposes, but I ask you to respect its copyright and so to use it only in its original form, showing the copyright attribution of the original.
4. If you have general comments or suggestions for improving it, please send them to me, and I will try to incorporate them in subsequent versions.
5. If you wish to use a modified form of the questionnaire, then please send me the changes and I will produce a new version for you.
6. Please contact me over any other potential uses or applications of this questionnaire.
7. Use of this LNA implies you have read and accept the above.

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## Directions for use

1. Do not take a long time to complete the questionnaire. Try to complete each page in less than one minute.
2. Look at each skill on the left of each page. Read the two descriptors that respectively identify a weakness/absence of the skill and a well developed competency in it.
3. Mark the point on the 1-8 scale that you think best describes your current competency.
4. Later, you can add free comments in the boxes on the right to identify (a) evidence of your competence or achievement, and (b) actions you might take to improve your skill in that area.
5. At the end, look at your scores, decide which skills are your strongest and weakest
6. Identify your learning needs and consider how to satisfy those needs by seeking advice, reading about it, attending courses. However, remember many career and life skills are learnt through experience.
7. Discuss learning priorities with your supervisor and peers.

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Notes:~

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Name..... Date completed.....

CRITICAL EVALUATION OF RESEARCH												
Skill	Descriptors	1	2	3	4	5	6	7	8	Example as evidence of my skill	How to improve my skill in this area	
Critical evaluation of methods used in a scientific paper or report	I find it very difficult to evaluate methods, so I don't read them or I ask someone else to interpret them									I have read a large number of papers and do not have significant problems in evaluating methods		
Critical evaluation of conclusions drawn from a published study	I can rarely evaluate the conclusions critically and/or often do not understand the conclusions									Generally, I understand the authors' arguments and conclusions, and can criticise them		
Ability to defend my evaluation of a research project in a seminar or journal club presentation	I cannot do this									I am confident and relish the argument involved		
Ability to draw conclusions from conflicting sets of data	I cannot do this with any confidence									Generally, I can do this, and understand why the data conflict or appear to conflict		
Writing a critical review (or chapter to the introduction to the thesis) that is at a publishable standard	I have not done this, nor do I know how to go about it									I have done this and my supervisor has agreed its publishable standard		
Ability to critically evaluate the conclusions that I have drawn from my own research	I find this very hard to do									I can do this, and others agree with me, or understand my evaluation when I explain it		
Describing how my findings relate to the published literature, and how my findings make an original contribution to that subject	I cannot do this effectively because I do not understand my findings or do not know the literature well enough									I understand and know the extent of the literature and can relate my findings to it		

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UNDERSTANDING THE RESEARCH ENVIRONMENT												
Skill	Descriptors	1	2	3	4	5	6	7	8	Example as evidence	How to improve my skill in this area	
Understanding and applying Intellectual Property Rights (IPR)	I do not understand the principles behind the acquisition and protection of IPR	1	2	3	4	5	6	7	8	I understand the IPR principles and have a working knowledge or first hand experience of them		
Understanding the principles of attribution of authorship, copyright and the requirements of the Data Protection Act	I do not know how authorship is attributed, what copyright is or how the DPA works	1	2	3	4	5	6	7	8	I am familiar with all aspects of this and have practical experience of authorship, copyright and the DPA		
The principles of informed consent in clinical research	I am unclear what informed consent is, and do not know how the principles are applied	1	2	3	4	5	6	7	8	I understand the principles, and have experience of clinical experimentation involving consent		
Ethical committees and ethical approval	I do not know what ethical approval is, nor do I know about my local ethical review committee	1	2	3	4	5	6	7	8	I understand the workings of my local ethical committee and have made a successful application		
The law on health and safety issues and an ability to demonstrate responsible working practices	I do not know the scope of the law, nor what is required to demonstrate responsible working	1	2	3	4	5	6	7	8	I can understand and follow health and safety procedures, including the processes of formal risk assessment, and I can demonstrate safe working practice		
Writing and submitting an application for a grant to support research	I have no knowledge or experience of the processes of preparing and submitting a grant application to support research	1	2	3	4	5	6	7	8	I understand how grant applications are assessed and I have contributed to the drafting or assessment of grant applications		
Writing a scientific article for publication	I have no direct experience of this and/or very little understanding of the writing or publishing processes	1	2	3	4	5	6	7	8	I have written, or contributed significantly to writing, a published scientific article		
The processes controlling publication of scientific articles and other writing	I do not know how journal editors select articles for publication, and have no experience of assessing manuscripts	1	2	3	4	5	6	7	8	I understand how articles are assessed for publication and I have some experience of contributing to the assessment of manuscripts.		

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RESEARCH MANAGEMENT												
Skill	Descriptors	1	2	3	4	5	6	7	8	Example as evidence	How to improve my skill in this area	
Software programmes (e.g. WINDOWS, WORD, EXCEL, POWERPOINT, REFERENCE MANAGER)	I have little or no experience of or confidence in using software for word processing, preparing spread sheets and illustrations, or handling references	1	2	3	4	5	6	7	8	I am fully familiar with the software packages that I need for my thesis (WINDOWS, WORD, EXCEL, POWERPOINT Reference Manager etc)		
Literature bases (such as MEDLINE) that I need for my thesis and publications	I have little or no experience of using literature databases	1	2	3	4	5	6	7	8	I am familiar with the databases I need in my research, and can use them to extract and export information.		
Bioinformatics and related databases for gene and protein analysis	I know that databases exist, but have no knowledge or understanding of using them	1	2	3	4	5	6	7	8	I understand what bioinformatics involves, which databases are available, and I have experience in using them effectively and confidently.		
Statistical methods and packages	I have a basic knowledge of statistics, but find it hard to know or decide which tests to use, or how knowledge of statistics can inform my design of experiments	1	2	3	4	5	6	7	8	I am fully familiar with and can use effectively the statistical methods and packages (eg SPSS) that I will need to complete my thesis		
Recording experiments and keeping records	I do not have a consistent strategy that allows me to record information, or that enables others to understand what I have done.	1	2	3	4	5	6	7	8	I keep up-to-date records of all I do in a logical manner that is easily understood by anyone who reads them		
Research planning and achieving goals	I find it hard to plan and/or to set priorities	1	2	3	4	5	6	7	8	I can set research goals for the next six month period. I can organise intermediate milestones and I can prioritise my day-to-day activities so that I meet these		

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PERSONAL EFFECTIVENESS												
Skill	Descriptors	1	2	3	4	5	6	7	8	Example as evidence	How to improve my skill in this area	
Acquisition of knowledge	My ability to gain knowledge is weak	1	2	3	4	5	6	7	8	I am highly competent at acquiring new knowledge		
Originality and innovation in approaches to research	My approach to research is devoid of originality, or I am not innovative in my approach	1	2	3	4	5	6	7	8	I am highly creative in my approach to research, I use innovative strategies and the best technology available.		
Self awareness and the ability to identify weak spots and improve knowledge and performance accordingly	I am very unsure of my skills and competencies, and do not know how to improve them.	1	2	3	4	5	6	7	8	I regularly assess my own competency in many skills areas, and successfully improve deficiencies through courses, experience etc.		
Self discipline, motivation and thoroughness	I feel inadequate in respect of some or all of these qualities	1	2	3	4	5	6	7	8	I can work efficiently and am strongly self-motivated		
I recognise limitations and can draw on other sources of support and assistance as appropriate	I often do not recognise my deficiencies, or do not effectively obtain help or use it	1	2	3	4	5	6	7	8	I know the limits of my abilities, and can ask for help and use it successfully		
Independent working	I lack confidence to study and research independently, to make decisions without help, or am unsure what decisions I need to take	1	2	3	4	5	6	7	8	I am able to work independently of detailed guidance, and to make informed decisions about the direction and nature of my research		

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COMMUNICATION SKILLS												
Skill	Descriptors	1	2	3	4	5	6	7	8	Example as evidence	How to improve my skill in this area	
Writing skills in different areas (i) research abstract	I find it hard to write a concise and effective abstract	1	2	3	4	5	6	7	8	I have written and published abstracts		
(ii) progress reports	I am unclear how to report on research progress and how to select the appropriate information	1	2	3	4	5	6	7	8	I can write informative and pertinent reports about my research		
(iii) a written publication	I do not have the skill or confidence to draft a paper for publication	1	2	3	4	5	6	7	8	Documents I have written have been submitted successfully for publication		
(iv) a thesis	I am unsure what is involved in preparing my thesis	1	2	3	4	5	6	7	8	I have written and completed my thesis to the satisfaction of my supervisor and myself		
Presentation skills (i) a poster	I have no, or only little, experience of preparing a poster and am unfamiliar with the software to use	1	2	3	4	5	6	7	8	I am able to produce a high quality poster describing my work, and to discuss it effectively with viewers		
(ii) oral presentation in a seminar or at a conference	My skills are very limited, and I have trouble in deciding what to say, how to keep to time and how to answer questions	1	2	3	4	5	6	7	8	I am confident that I can prepare and deliver a good presentation with highly relevant content and good visual aids (using e.g. PowerPoint)		
Receiving constructive criticism	I find it hard to accept criticism, I feel defensive about my work and ideas, and often do not use advice/criticism effectively	1	2	3	4	5	6	7	8	I willingly and effectively take constructive criticism from colleagues to incorporate it in planning my research		
Giving constructive criticism	I am reluctant to give any form of criticism, even when I understand the subject, or I never know what to say	1	2	3	4	5	6	7	8	I can contribute to seminar discussions with constructive criticism, and enjoy the process		
Support learning in others by lecturing, small group teaching, demonstrating.	I have no experience and/or little ability to teach others in any forum	1	2	3	4	5	6	7	8	I can plan and deliver a lecture, seminar, demonstration or tutorial, setting learning objectives and I am able to assess my own performance		

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WORKING WITH OTHERS												
Skill	Descriptors									Example as evidence	How to improve my skill in this area	
Co-operative working	I find it difficult to work co-operatively with others in my workplace	1	2	3	4	5	6	7	8	I can work co-operatively with those with whom I share office or laboratory space		
Understanding behaviour in groups	I frequently do not understand other peoples' behaviour or find it hard to accept their apparent needs or wants	1	2	3	4	5	6	7	8	I understand the roles of each member of the team, and can accept they have diverse aspirations and needs		
Discussions in groups	I find it difficult to contribute, to be heard or to get my point across	1	2	3	4	5	6	7	8	I interact effectively in group discussion, I can get my point across and contribute productively		
Networking in my institution	I have no experience or have had no success in this	1	2	3	4	5	6	7	8	I can network with colleagues in my institution		
Networking outside my institution	I have no experience or have had no success in this	1	2	3	4	5	6	7	8	I can build effective links with colleagues in other universities, organisations and companies		
Working with a supervisor or mentor	I find it difficult to work with my supervisor because, for e.g. I cannot assert my views and ideas, or get timely advice	1	2	3	4	5	6	7	8	I have an effective relationship that allows me to express my views and to receive expert and objective help		

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CAREER MANAGEMENT												
Skill	Descriptors									Example as evidence	How to improve my skill in this area	
Understanding career options	I do not know exactly what I want to do when I graduate and/or I do not know what options will be open to me	1	2	3	4	5	6	7	8	I have a comprehensive understanding of academic and non-academic career options that are open to me		
Development of personal and career skills through training	I cannot see the point of developing such skills at this stage because my focus is on a specific research project	1	2	3	4	5	6	7	8	I understand how these skills can help my research now and future career		
Taking responsibility for myself	I feel I am being pushed into training courses against my personal wishes	1	2	3	4	5	6	7	8	I understand the need to take personal responsibility for developing my skills		
Setting career goals	I do not have any career goals, or I am not confident that the goals I have are realistic	1	2	3	4	5	6	7	8	I can set realistic career goals and identify action that I can take to improve my employability and competitiveness		
Presenting my personal skills to others	I do not know how effectively I can present my own skills to others	1	2	3	4	5	6	7	8	I know from independent feedback, that I can present my skills to others optimally through CVs, applications and in interview		