International Advanced Level
Subject: Chemistry
The need for Transferable Skills

Sources: Cognitive/Intrapersonal and Interpersonal skills adapted and taken from the NRC framework

In recent years, higher education institutions and employers have consistently highlighted the need for students to develop a range of transferable skills to enable them to respond with confidence to the demands of undergraduate study and the world of work. The Organisation for Economic Co-operation and Development (OECD) defines skills, or competencies, as 'the bundle of knowledge, attributes and capacities that can be learned and that enable individuals to successfully and consistently perform an activity or task and can be built upon and extended through learning'.

To support the design of our qualifications, the Pearson Research Team selected and evaluated seven global 21st-century skills frameworks. Following on from this process, the team identified the National Research Council's (NRC) framework as the most evidence-based and robust skills framework, and have used this as a basis for our adapted skills framework.

The framework includes cognitive, intrapersonal skills and interpersonal skills. These skills have been interpreted to ensure they are appropriate for this subject. All of the skills listed are evident or accessible in the teaching, learning and/or assessment of the qualification.

Identifying and highlighting these skills in International Advanced Level qualifications ensures that it is not only the academic and cognitive skills that are developed, but those broader elements that universities highlight as being essential for success. Skills such as self-directed study, independent research, self-awareness of own strengths and weaknesses and time-management are skills that students cannot learn from a textbook but have to be developed through the teaching and learning experience that can be provided through an international curriculum.

In the tables below, we have taken the NRC framework skills and provided definitions of how each skill can be interpreted for this subject. This will enable teachers and learners to understand examples of how they can develop each skill through an International Advanced Level qualification.

Intrapersonal skills

Intellectual Openness	
Adaptability	This occurs in any practical.
Personal and social responsibility	Soluble laundry bags. Catalytic converters.
Continuous Learning	
Intellectual interest and curiosity	Use of Chemistry in biological systems. E.g. buffers in blood and food. Haemoglobin in blood. Cancer drugs *cis*-platin.
Work ethic/conscientiousness	
Initiative	Investigation of chemical reactions.
Self-direction	Preparations.
Responsibility	Health and safety and the difference between hazard and risk.

Interpersonal skills

Teamwork and collaboration	
Communication	This occurs in any practical when working with a partner.
Collaboration	This occurs in any practical when working with a partner.
Teamwork	Preparation of aspirin in a group.
Co-operation	This occurs in any practical when working with a partner.
Interpersonal skills	This occurs in any practical when working with a partner.
Empathy/perspective taking	This occurs in any practical when working with a partner.
Negotiation	This occurs in any practical when working with a partner.
Leadership	

Cognitive skills

Cognitive Processes and Strategies	
Critical thinking	Discuss uncertainty of measurements in practical work.
Problem solving	Calculate formulae from data.
Analysis	Interpret mass spectra, infrared spectra and nmr spectra.
Reasoning/argumentation	Analysis of unknown organic and inorganic compounds.
Interpretation	Ability to interpret graphs.
Decision Making	Plan organic reaction schemes (with up to 4 steps).
Adaptive learning	Predictions from data. Select equipment and methods for carrying out practical work.
Executive function	

Perseverance	Purification of an organic compound.
Productivity	Improving manufacturing processes.
Self-regulation (metacognition, forethought, reflection)	Suggest ways to reduce risks when dealing with chemicals.
Ethics	Use of chromatography in drug testing. Climate change. Carbon neutrality fuels. Pollution. Biodegradable polymers/ incineration of polymers.
Integrity	-
Positive Core Self Evaluation	
Self-monitoring/self-evaluation/self-reinforcement	Carrying out practical work individually.

Leadership	This occurs in any practical when working with a partner.
Responsibility	This occurs in any practical when working with a partner.
Assertive communication	This occurs in any practical when working with a partner.
Self-presentation	

Creativity	
Creativity	Devising experimental procedures. Identify errors and uncertainties and how to improve outcomes.
Innovation	Suggest uses of new materials e.g. graphene.