International Advanced Level
Subject: Information Technology
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.

NRC framework skill	Skill interpretation in this subject	Where the skill is covered in content	Where the skill is explicitly assessed in examination	Opportunity for the skill to be developed through teaching and learning approach
Cognitive skills				
Cognitive Processes and Strategies				
Critical thinking	Developing a well-supported, clearly articulated argument to support a view and using it to justify one or more conclusions. Designing IT systems that meet requirements. Evaluating IT systems, considering their suitability for intended audience and purpose and identifying strengths and weaknesses. Understanding the potential and impact of IT systems on individuals, organisations and society.	Unit 1: 2.3.1 Understand the impact of network security issues on individuals and organisations (threats and solutions, open networks). Unit 1: 4.4.1 Understand the advantages and disadvantages of IT systems for individuals and organisations. Unit 3: 1.3.3 Understand the impact of storing big data. Unit 3: 3.1.1 Understand the role of IT systems in organisations. Unit 3: 4.1.7 Be able to analyse a completed project to identify strengths and weaknesses in project management. Unit 4: 1.3.4 Be able to evaluate the effect a database will have on user experience and suggest improvements.	Paper 1, Q1(d) Paper 1, Q2(a) Paper 1, Q6 Paper 2, Q6 Paper 3, Q1(b) Paper 3, Q3(a) Paper 3, Q3(b) Paper 3, Q6 Paper 4, Q2(c) Paper 4, Q5	Individual, group and whole class activities can provide opportunities for students to develop/demonstrate their critical thinking skills. For example, students could review their schools' IT systems, assessing their fitness for purpose and suggesting improvements. They could be asked to debate the benefits and drawbacks of storing data in the cloud or produce a report on the causes of the digital divide.

NRC framework skill	Skill interpretation in this subject	Where the skill is covered in content	Where the skill is explicitly assessed in examination	Opportunity for the skill to be developed through teaching and learning approach
Problem solving	Breaking down a problem into its component parts, establishing their relationship to each other and to the problem as a whole. Developing IT solutions that meet specified requirements. Evaluating solutions in terms of their fitness for purpose and efficiency and identifying ways in which they could be improved.	Unit 1: 2.2.4 Be able to produce outline designs for networks to meet specified requirements that take account of location of devices. Unit 1: 4.1.3 Be able to design IT systems, from individual components and sub-systems, to meet specified requirements. Unit 2: 2.4.1 Be able to use CSS transitions and transforms to create animations. Unit 2: 4.3.1 Be able to design intuitive navigation systems. Unit 3: 1.2.3 Be able to normalise a collection of data into first, second, and third normal forms. Unit 4: 2.1.1 Be able to construct and amend relational databases. Unit 4: 3.4.1 Be able to evaluate the effectiveness and appropriateness of a completed solution and identify whether the solution is 'fit for purpose'.	Paper 1, Q3(b) Paper 1, Q5(b) Paper 2, Q4 Paper 2, Q5 Paper 3, Q3(b) Paper 3, Q7 Paper 4, Q1(c) and (d) Paper 4, Q2 (b)(i) and (b)(ii) Paper 4, Q4	Individual, group and whole class activities can provide opportunities for students to undertake problem solving activities. They could be asked to select hardware and software for a specific user or group of users, create a relational database solution or use JavaScript to add interactivity to a website.
Analysis	Examining the flow of documents, information and material in order to understand how an IT system works. Using database analysis techniques to identify entities, attributes and relationships Analysing requirements and user needs.	Unit 1: 4.1.2 Understand how to decompose a system into smaller sub-systems and components. Unit 1: 4.2.2 Be able to interpret and create dataflow diagrams for a given scenario. Unit 1: 5.2.4 Be able to interpret and create entity relationship diagrams for a given scenario. Unit 4: 1.2.1 Be able to analyse the needs of users in a range of contexts.	Paper 1, Q5(a) and (b) Paper 2, Q4 Paper 2, Q6 Paper 3, Q4(b) Paper 3, Q7 Paper 4, Q1(c)	Students will be able to develop and demonstrate their ability to analyse whilst working on problem solving activities.
Reasoning/argumentation	Assessing a number of alternative solutions and selecting the most appropriate. Weighing up advantages and disadvantages and making a recommendation. Explaining the rationale for decisions made and being prepared to argue your case.	Unit 1: 3.2.1 Understand the impact and potential of working in online environments for individuals and organisations. Unit 1: 6.2.2 Understand the moral and ethical issues associated with the use of IT.	Paper 1, Q2(a) Paper 1, Q6 Paper 3, Q3(a) Paper 3, Q4 Paper 3, Q5(b) Paper 4, Q5	Students should be challenged to explain/justify the choices/decisions they make when producing IT solutions to problems. They should be given opportunities to assess the extent to which existing IT systems are fit for purpose. Class or group, helping students develop critical thinking, reasoning and presentation skills.
Interpretation	Interpreting and using diagrams, models, charts etc. for given scenarios.	Unit 1:4.3.2 Be able to interpret and create flowcharts for a given scenario. Unit 3: 1.1.3 Be able to interpret and construct a data dictionary. Unit 3: 4.1.6 Be able to interpret and use tools of project management.	Paper 1, Q5(a) and (b) Paper 2, Q4 Paper 3, Q3(b) Paper 3, Q4(b)	Students should be given repeated opportunities to interpret information presented in diagrams, tables, sketches, charts and wire frames.

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Decision making	Considering multiple options or alternatives, in order to select a solution that best fulfils requirements/needs.	Unit 1: 1.1.9 Be able to select digital devices to meet the needs and requirements of individuals and organisations. Unit 2: 4.1.3 Understand how to use design principles to create effective page layout and design. Unit 3: 1.1.5 Be able to interpret and design validation rules for a given situation. Unit 4: 3.2.2 Be able to create appropriate system outputs for a database solution that effectively aid users.	Paper 1, Q3(b) Paper 3, Q3(b) This skill is also assessed implicitly in the two practical examinations (Paper 2 and Paper 4).	Students will have an opportunity to develop and demonstrate decision-making whilst working on problem solving activities.
Adaptive learning	Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts.	Unit 1: 1.1.2 Understand the technologies that are used by digital devices and how these impact the design and use of devices. Unit 2: 3.3.4 Understand how to combine JavaScript with HTML and CSS to create page components. Unit 3: 3.1.2 Understand the concept of transaction processing (TP) and how and why organisations use TP systems. Unit 3: 5.1.2 Understand the impact of and possibilities associated with machine learning. Unit 4: 1.2.1 Be able to apply understanding of user characteristics to develop appropriate database solutions.	Paper 1, Q1(c) Paper 1, Q3(c) Paper 3, Q1(b) Paper 3, Q3(a) This skill is also assessed implicitly in the two practical examinations (Paper 2 and Paper 4).	Students should be encouraged to adapt what they have learnt in one context to another less familiar one. For example, they could be set the task of researching how and why a chain of supermarkets uses a CRM system and then asked to consider the benefits of a CRM system for a different type of business, such as a healthcare provider.
Executive function	Managing self and own resources in order to achieve a goal.	This skill is covered implicitly in Unit 2 and 4, which require students to work independently to produce solutions that are fit for purpose.	This skill is assessed implicitly in the two practical examinations (Paper 2 and Paper 4).	Students will have an opportunity to develop and demonstrate executive function whilst working on complex projects independently or as part of a group.
Creativity				
Creativity	Producing effective IT solutions to problems.	Topic 4 of Unit 2 is about creative use of the web coding skills students have acquired to create effective web pages. Topic 3 of Unit 4 deals with creating effective database solutions that are fit for purpose and meet user needs.	This skill is assessed implicitly in the two practical examinations (Paper 2 and Paper 4).	Practical problem solving tasks give students an opportunity to develop and demonstrate creativity and innovation.
Innovation	Thinking 'outside the box', looking for ways to raise the bar and having the courage to try something new.	In Unit 3 students are encouraged to consider how the use of big data and adoption of emerging technologies can lead to innovative ideas, practices and operational applications.	Paper 3, Q3(b)	

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Intrapersonal skills				
Intellectual openness				
Adaptability	Adapting to changing circumstances by amending plans and making refinements.	This skill set is not covered in the subject content.	These skills are not explicitly assessed.	Students' intrapersonal skills can be formatively assessed through observation of how they behave when undertaking developmental activities, such individual challenges and group projects.
Personal and social responsibility	Recognising how own behaviour affects others, and being accountable for own actions.			
Continuous learning	Continuously striving to extend own knowledge, understanding and skill set. Planning and reflecting on own learning, setting goals and reviewing progress regularly.			
Intellectual interest and curiosity	Seeking to broaden understanding and explore new concepts.			
Work ethic/conscientiousness				
Initiative	Using own judgment and doing things without needing to be told what to do.	This skill set is not covered in the subject content.	These skills are not explicitly assessed, although they are implicitly assessed in the two practical examinations (Paper 2 and Paper 3).	Students' work ethic/conscientiousness skills can be formatively assessed through observation of their approach to tackling challenging/complex tasks.
Self-direction	Setting own goals and working independently to achieve them.			
Responsibility	Taking ownership of own work, acting independently and making own decisions.			
Perseverance	Overcoming setbacks and responding to challenges.			
Productivity	Using project management tools to plan and manage IT projects.			
Self-regulation (metacognition, forethought, reflection)	Monitoring and controlling own actions, altering behaviour in accordance with the demands of the situation.			
Ethics	Demonstrating awareness of moral and ethical issues associated with the use of IT.	Unit 1: 6.2.2 Understand the moral and ethical issues associated with the use of Information Technology systems.	Paper 1, Q2(d).	
Integrity	Behaving honestly and doing the right thing.	This skill is not covered in the subject content.	This skill is not explicitly assessed.	

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Positive Core Self Evaluation				
Self-monitoring/self-evaluation/self-reinforcement.	Planning and reviewing own work as a matter of course.	This skill is not covered in the subject content.	This skill is not explicitly assessed.	Development logs/diaries can be used to develop and formatively assess self-evaluation.
Interpersonal skills				
Teamwork and collaboration				
Communication	Communicating ideas to peers and teachers verbally or in writing.	This skill set is not covered in the subject content.	These skills are not explicitly assessed.	Teamwork and collaboration skills can be formatively assessed by observing students taking part in a group activities and peer mentoring others.
Collaboration	Working with others to carry out a shared task.			
Teamwork	Working in a team to complete an IT project, encouraging and giving appropriate feedback to fellow team members.			
Co-operation	Working cooperatively on a team project, sharing expertise and know-how.			
Interpersonal skills	Communicating effectively with others.			
Empathy/perspective taking	Being aware and taking account of the feelings of others			
Negotiation	Discussing with others in order to reach an agreement.			
Leadership				
Leadership	Leading a team to complete a group activity.	This skill set is not covered in the subject content.	These skills are not explicitly assessed.	Leadership skills can be formatively assessed by giving every student an opportunity to lead a team to carry out a project.
Responsibility	Taking responsibility for the progress and outcomes of a group task.			
Assertive communication	Chairing a meeting, allowing/ encouraging other attendees to contribute and directing the discussions to a conclusion.			
Self-presentation	Conveying a positive image of oneself to others.			