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IMPLEMENTATION GUIDANCE: INFORMATION AND COMMUNICATIONS TECHNOLOGIES NON-AUTHORITATIVE LEARNING OUTCOMES

Purpose

Changes in technology across the financial reporting supply chain are impacting the expected Information and Communications Technologies (ICT) competencies and skills of aspiring and professional accountants to perform their roles. Identifying the ICT skills needed by aspiring and professional accountants serves the public interest by enabling the accounting profession to provide high-quality financial reporting, auditing, or other related financial and accounting services in the digital age.

The purpose of this guidance is to provide non-authoritative ICT-related learning outcomes to enhance the professional competence and development and application of the knowledge, skills, and behaviors needed in ICT by aspiring and professional accountants. These non-authoritative learning outcomes when considered individually, or in aggregate, may assist in identifying specific knowledge, skills and behaviors needed in ICT by aspiring and professional accountants.

Audience

This guidance may be useful for higher education institutions, IFAC member bodies[1], employers, professional organizations and regulators in designing accountancy education programs.

Use

The following non-authoritative ICT-related learning outcomes provide further depth, flexibility and disaggregation to supplement the learning outcomes within the IES competence areas. They represent a progression of knowledge, skills and behaviors in ICT for both aspiring and professional accountants, as they progress in their career and operate in different roles. These non-authoritative learning outcomes were based on engagement activities performed during the IAESB's outreach on Information and Communications Technology and are not intended to be all inclusive. As such, the below can be used as a basis to develop further learning outcomes specific to the user's circumstances.

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[1] The IESs acknowledge an IFAC member organization may:
- Include additional competence areas;
- Increase the level of proficiency for some competence areas; and
- Develop additional learning outcomes that are not specified in the IESs.

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IES 2 – *Initial Professional Development – Technical Competence*

(b) Management Accounting

Related Learning Outcomes from IES	**PROGRESSION**	
IES 2 (b) (iv) Analyze data and information to support management decision making.	• Describe how structured, semi-structured and unstructured data are used by an organization to capture and record transactions.	• Use ICT, including data analytics and visualization tools and techniques, to enhance the presentation, communication and interpretation of data and information for decision making.

(f) Governance, risk management and internal control

Related Learning Outcomes from IES	**PROGRESSION**		
IES 2 (f) (i) Explain the principles of good governance, including the rights and responsibilities of owners, investors, and those charged with governance; and the role of stakeholders in governance, disclosure, and transparency requirements.	• Identify methods of secure data transmission to support compliance with regulatory requirements and ethical principles. • Recognize where data handling or sharing with third parties has breached regulatory requirements or an organization's internal policies or procedures. • Describe how ICT is used for governance, risk management and compliance, and enterprise resource planning purposes.	• Use ICT, including data analysis and visualization tools, to facilitate reporting to those charged with governance.	• Select appropriate ICT to communicate data and information to internal and external stakeholders.

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(f) Governance, risk management and internal control		
Related Learning Outcomes from IES	**PROGRESSION**	
IES 2 (f) (ii) Analyze the components of an organization's governance framework.	• Discuss the importance of integrating ICT risk management factors within an organization's overall risk management framework.	
IES 2 (f) (iii) Analyze an organization's risks and opportunities using a risk management framework.	• Identify opportunities to use ICT to enhance communication with those charged with governance. • Identify additional security risks introduced by the use of ICT. • Identify relevant and reliable data and information to inform the assessment of an organization's risks. • Identify risks or threats to an organization's security of data and information posed by the external environment, including in contracts with third party suppliers. • Explain process or system failures that contribute to increased ICT risk.	• Use ICT, including data analysis and visualization tools, to identify points of increased risk in an organization's processes and controls.
IES 2 (f) (iv) Analyze the components of internal control related to financial reporting.	• Identify similarities and differences between ICT applications and technology environments that serve as the basis for performing an individual's professional responsibilities.	

(f) Governance, risk management and internal control			
Related Learning Outcomes from IES	**PROGRESSION**		
IES 2 (f) (v) Analyze the adequacy of systems, processes and controls for collecting, generating, storing, accessing, using, or sharing data and information.	• Explain how data and information is transferred into, within and out of an organization. • Describe how to protect data and information shared with third parties. • Describe how to protect systems, data and information from internal and external security threats, including when working with third parties.	• Use ICT to analyze the efficiency and effectiveness of processes and controls in an organization. • Use ICT to identify process and control failures in an organization and determine the root cause of these failures. • Analyze the adequacy of an organization's processes and controls to protect data and information from unauthorized access, transformation and transmission.	• Develop appropriate responses to process and control failures. • Design processes and controls to protect data and information from unauthorized access, transformation and transmission. • Evaluate the impact of process and control failures on an organization. • Assess the completeness and accuracy of data and information derived from digital sources.

(g) Business laws and regulations		
Related Learning Outcomes from IES	**PROGRESSION**	
IES 2 (g) (iii) Apply data protection and privacy regulations when collecting, generating, storing, accessing, using, or sharing data and information.	• Demonstrate collaboration when interacting with individuals both inside and outside of accounting functions to ensure the appropriate use of data and information within an organization.	

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(h) Information and communications technologies			
Related Learning Outcomes from IES	**PROGRESSION**		
IES 2 (h) (i) Explain the impact of Information and Communications Technologies (ICT) developments on an organization's environment and business model. IES 2 (h) (ii) Explain how ICT supports data analysis and decision making	• Identify new and emerging ICT to support improved decision making. • Explain the integration of people, technology and processes when developing ICT strategies.	• Analyze the benefits and costs of ICT for improved business outcomes.	• Select appropriate ICT through consideration of its costs, benefits and limitations. • Advise on appropriate ICT strategies that support an organization's business objectives.
IES 2 (h) (iii) Explain how ICT supports the identification, reporting, and management of risk in an organization.	• Recognize stakeholders' data and information needs and expectations.		• Prepare data and information visually to support improved decision making.
IES 2 (h) (iv) Use ICT to analyze data and information.	• Describe an organization's data and information processes including the flow of information, movement of documents, human intervention and ICT dependencies. • Describe the data source and the nature and extent of procedures performed when conducting data analysis. • Explain the differences between prescriptive, predictive, diagnostic and descriptive data analysis. • Discuss the integrity of data and information obtained from digital sources.	• Use relevant and reliable data and information when performing analysis. • Use data and information from a variety of sources to support decision making and solve problems. • Use ICT to review, extract and transform relevant data. • Use ICT to identify trends, patterns and outliers in data and information. • Apply ICT to interrogate a technology data source.	

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(h) Information and communications technologies			
Related Learning Outcomes from IES	**PROGRESSION**		
IES 2 (h) (v) Use ICT to enhance the efficiency and effectiveness of communication.	• Describe the advantages and disadvantages of using different graphical options or other outputs generated by visualization tools. • Describe how data and information can be analyzed and presented.	• Use visualization tools to communicate insights from an analysis of data.	• Prepare data and information in a form that is useful for internal and external stakeholders. • Evaluate how new and emerging ICT has the potential to change the channels of communication from and across systems.
IES 2 (h) (vi) Apply ICT to enhance the efficiency and effectiveness of an organization's systems. IES 2 (h) (vii) Analyze the adequacy of ICT processes and controls. IES 2 (h) (viii) Identify improvements to ICT processes and controls.	• Identify improvements to processes using ICT, including producing summarized management reporting for decision making, protecting access and integrity of financial information and identifying new sources of technology that enhance reporting. • Describe how ICT risks can be mitigated through design and implementation of effective processes and controls. • Summarize the advantages and disadvantages of data visualization tools. • Identify the impact of risks, processes and flows of data and information, to an organization. • Identify when an organization should seek advice from experts on the adoption and integration of ICT. • Identify the appropriate timing to adopt new ICT.	•	• Plan the effective implementation of new ICT.

(i) Business environment and organizational environment

Related Learning Outcomes from IES	**PROGRESSION**	
IES 2 (i) (i) Describe the environment in which an organization operates, including the primary economic, legal, regulatory, political, technological, social, and cultural aspects.	• Describe how ICT can impact business models and drivers of value. • Discuss emerging ICT trends impacting an organization.	• Analyze the implications of technological, operational, security and business issues critical to maintenance of an ICT environment.

(k) Business strategy and management

Related Learning Outcomes from IES	**PROGRESSION**
IES 2 (k) (iv) Explain the processes that may be used to develop and implement the strategy of an organization.	• Describe relevant ICT processes and controls applicable to an organization. • Identify how processes can be improved by using ICT, such as producing summarized management reporting for decision making, protecting access and integrity of data and information, and identifying technologies that enhance communication. • Describe the impact ICT has on business models and risk, including how current and emerging ICT have the potential to impact the way business is conducted and measured. • Describe how strategic business decisions can be based on the integration of appropriately analyzed data sets and professional judgment.

IES 3 – *Initial Professional Development – Professional Skills*			
(a) Intellectual			
Related Learning Outcomes from IES	**PROGRESSION**		
IES 3 (a) (i) Evaluate data and information from a variety of sources and perspectives through research, integration, and analyses. IES 3 (a) (ii) Apply critical thinking skills to solve problems, inform judgments, make decisions, and reach well-reasoned conclusions.	• Describe how new and emerging ICT operate, are used, and impact the generation, processing, and flow of data. • Identify meaningful insights through the consideration of trends, patterns, outliers, and unexpected relationships within data and information. • Identify similarities and differences between ICT applications and environments when performing work activities.	• Apply ICT to extract and interrogate data. • Apply ICT to analyze structured data and information and facilitate the analysis of semi-structured and unstructured data and information. • Apply predictive analytics to solve business problems. • Apply reasoning and professional judgment to identify, evaluate and conclude on the optimal solution based on the facts, circumstances and risk assessments • Use visualization tools to conduct data analysis.	• Evaluate the reliability, accuracy and relevance of data and information used by an organization. • Evaluate the results of data interrogation, synthesis and analysis to conclude on applicability and reasonableness of different outcomes.

(b) Interpersonal and communication			
Related Learning Outcomes from IES	**PROGRESSION**		
IES 3 (b) (i) Demonstrate collaboration, cooperation, and teamwork when working towards organizational goals. IES 3 (b) (ii) Communicate clearly and concisely when presenting, discussing, and reporting in formal and informal situations IES 3 (b) (vi) Apply consultative skills to minimize or resolve conflict, solve problems, and maximize opportunities.	• Discuss the potential for emerging ICT to improve processes, controls and stakeholder engagement. • Identify where ICT could negatively impact interpersonal communication. • Identify opportunities to communicate to individuals outside of the finance or governance functions who will benefit from understanding how technology impacts the use of data and information as it flows through the financial reporting cycle. • Identify the appropriate channel to communicate to individuals within or outside the organization.	• Apply ICT to identify, prepare and share information with internal and external stakeholders. • Apply ICT to communicate effectively and enhance professional relationships. • Prepare and provide constructive feedback to peers, supervisors and subordinates on areas for professional growth and development.	• Create opportunities for peers, supervisors and subordinates to provide constructive feedback needed for professional growth and development. • Evaluate how new and emerging ICT has the potential to change the channels of communication from and across systems.

(c) Personal		
Related Learning Outcomes from IES	**PROGRESSION**	
IES 3 (c) (i) Demonstrate a commitment to lifelong learning.	• Identify gaps in ICT knowledge and skills by performing a periodic self-assessment.	• Demonstrate a commitment to seek out, use and evaluate new ICT tools and techniques. • Demonstrate a commitment to adapt to, and make use of, new and emerging ICT impacting an organization's business information systems. • Prepare a professional development plan to increase awareness and understanding of current and future ICT.
(d) Organizational		
Related Learning Outcomes from IES	**PROGRESSION**	
IES 3 (d) (iii) Apply people management skills to motivate and develop others.		• Create opportunities to address identified ICT gaps in other individuals' competencies and skills through, including, use of on the job training, peer feedback or encouragement to attend formal training.

IES 4 – *Initial Professional Development – Professional Values, Ethics and Attitudes*

(b) Ethical principles

Related Learning Outcomes from IES	**PROGRESSION**	
IES 4 (b) (iv) Evaluate the significance of threats to compliance with the fundamental principles of ethics and respond appropriately.		• Demonstrate objectivity, integrity, professional competence, due care, and professional skepticism when using ICT.
IES 4 (b) (v) Apply fundamental principles of ethics when collecting, generating, storing, accessing, using, or sharing data and information.	• Describe how personally identifiable data and information has the potential to be misused. • Identify personally identifiable data and information and evaluate how it is used for business purposes. • Identify regulatory requirements applicable to access, storage, generation, use and sharing of data and information.	• Apply working practices that limit access to data and information, including, use of secured storage, clean-desk policy and sharing data and information only when there is an appropriate business purpose.

IES 8 – Professional Competence for Engagement Partners Responsible for Audits of Financial Statements

(f) Information and communications technologies

Related Learning Outcomes from IES	**PROGRESSION**
IES 8 (f) (i) Evaluate the information and communications technologies (ICT) environment to identify controls that relate to the financial statements to determine the impact on the overall audit strategy.	• Analyze the implications of technological, operational, security and business issues critical to maintenance of an ICT environment that supports an organization's financial reporting. • Develop familiarity with cybersecurity attacks, defenses and related forensic tools to help investigate issues. • Evaluate the flow of data and information distinguishing between manual and automated activities to identify key controls that reduce risk of material misstatement. • Evaluate the sufficiency of digital evidence to demonstrate controls operating effectively.

(j) Personal

Related Learning Outcomes from IES	**PROGRESSION**
IES 8 (j) (i) Promote lifelong learning.	• Identify ICT related professional development activities to better prepare for changes in the business environment. • Instruct formal learning and development courses using ICT to increase its effectiveness. • Actively participate in ICT learning programs. • Adopt new ICT to effectively conduct business activities relevant to work responsibilities. • Promote an environment of innovation using ICT. • Support the development of staff during the audit engagement through effective use of ICT research activities and on the job training. • Support ICT development of staff during the audit engagement through effective supervision and review.

(n) Ethical principles	
Related Learning Outcomes from IES	**PROGRESSION**
IES 8 (n) (i) Promote the importance of compliance with the fundamental principles of ethics.[2] IES 8 (n) (ii) Evaluate and respond to threats to objectivity and independence that can occur during an audit.	• Demonstrate diligence in obtaining sufficient evidence before forming conclusions, including the reliability of data and information. • Evaluate pressures that introduce bias when client management and the engagement team form conclusions. • Demonstrate objectivity, integrity, professional competence and due care throughout the audit engagement when using ICT and while interacting with client management and those charged with governance. • Demonstrate behaviors that support the ethical conduct and application of regulatory requirements governing the use, handling, and sharing of data and information specific to privacy requirements. • Demonstrate behaviors that support the importance of protecting personally identifiable information from inappropriate use and disclosure.

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[2] The Fundamental Principles, *IESBA Handbook of the International Code of Ethics for Professional Accountants (including International Independence Standards) – 2018 Edition*, Section 110.

This document was prepared by the Staff of the International Accounting Education Standards Board (IAESB).

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