Ohio CTE

Information Technology Career Field: Information Technology

Business Operations/21st Century Skills: Learners apply principles of economics, business management, marketing, and employability in an entrepreneur, manager, and employee role to the leadership, planning, developing, and analyzing of business enterprises related to the career field. 1

Outcome 1.1 **Employability Skills: Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.** 1.1

1 Identify the knowledge, skills and abilities necessary to succeed in careers. 1.1.1.

2 Identify the scope of career opportunities and the requirements for education, training, certification, licensure and experience. 1.1.2.

3 Develop a career plan that reflects career interests, pathways and secondary and postsecondary options. 1.1.3.

4 Describe the role and function of professional organizations, industry associations and organized labor and use networking techniques to develop and maintain professional relationships. 1.1.4.

5 Develop strategies for self-promotion in the hiring process (e.g., filling out job applications, resume writing, interviewing skills, portfolio development). 1.1.5.

6 Explain the importance of work ethic, accountability and responsibility and demonstrate associated behaviors in fulfilling personal, community and workplace roles. 1.1.6.

7 Apply problem-solving and critical-thinking skills to work-related issues when making decisions and formulating solutions. 1.1.7.

8 Identify the correlation between emotions, behavior and appearance and manage those to establish and maintain professionalism. 1.1.8.

9 Give and receive constructive feedback to improve work habits. 1.1.9.

10 Adapt personal coping skills to adjust to taxing workplace demands. 1.1.10.

11 Recognize different cultural beliefs and practices in the workplace and demonstrate respect for them. 1.1.11.

12 Identify healthy lifestyles that reduce the risk of chronic disease, unsafe habits and abusive behavior. 1.1.12.

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Outcome 1.2 **Leadership and Communication: Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.** 1.2

1 Extract relevant, valid information from materials and cite sources of information. 1.2.1.

2 Deliver formal and informal presentations. 1.2.2.

3 Identify and use verbal, nonverbal and active listening skills to communicate effectively. 1.2.3.

4 Use negotiation and conflict-resolution skills to reach solutions. 1.2.4.

5 Communicate information (e.g., directions, ideas, vision, workplace expectations) for an intended audience and purpose. 1.2.5.

6 Use proper grammar and expression in all aspects of communication. 1.2.6.

7 Use problem-solving and consensus-building techniques to draw conclusions and determine next steps. 1.2.7.

8 Identify the strengths, weaknesses, and characteristics of leadership styles that influence internal and external workplace relationships. 1.2.8.

9 Identify advantages and disadvantages involving digital and/or electronic communications (e.g., common content for large audience, control of tone, speed, cost, lack of non-verbal cues, potential for forwarding information, longevity). 1.2.9.

10 Use interpersonal skills to provide group leadership, promote collaboration and work in a team. 1.2.10.

11 Write professional correspondence, documents, job applications and resumés. 1.2.11.

12 Use technical writing skills to complete forms and create reports. 1.2.12.

13 Identify stakeholders and solicit their opinions. 1.2.13.

14 Use motivational strategies to accomplish goals. 1.2.14.

Outcome 1.3 **Business Ethics and Law: Analyze how professional, ethical, and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance.** 1.3

1 Analyze how regulatory compliance affects business operations and organizational performance. 1.3.1.

. Follow protocols and practices necessary to maintain a clean, safe and healthy work environment. 1.3.2.

3 Use ethical character traits consistent with workplace standards (e.g., honesty, personal integrity, compassion, justice). 1.3.3.

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4 Identify how federal and state consumer protection laws affect products and services. 1.3.4.

5 Access and implement safety compliance measures (e.g., quality assurance information, safety data sheets [SDSs], product safety data sheets [PSDSs], United States Environmental Protection Agency [EPA], United States Occupational Safety and Health Administration [OSHA]) that contribute to the continuous improvement of the organization. 1.3.5.

6 Identify deceptive practices (e.g., bait and switch, identity theft, unlawful door-to-door sales, deceptive service estimates, fraudulent misrepresentations) and their overall impact on organizational performance. 1.3.6.

7 Identify the labor laws that affect employment and the consequences of noncompliance for both employee and employer (e.g., harassment, labor, employment, employment interview, testing, minor labor laws, Americans with Disabilities Act, Fair Labor Standards Acts, Equal Employment Opportunity Commission [EEOC]). 1.3.7.

8 Verify compliance with computer and intellectual property laws and regulations. 1.3.8.

9 Identify potential conflicts of interest (e.g., personal gain, project bidding) between personal, organizational and professional ethical standards. 1.3.9.

Outcome 1.4 **Knowledge Management and Information Technology: Demonstrate current and emerging strategies and technologies used to collect, analyze, record, and share information in business operations.** 1.4.

1 Use office equipment to communicate (e.g., phone, radio equipment, fax machine, scanner, public address systems). 1.4.1.

2 Select and use software applications to locate, record, analyze and present information (e.g., word processing, e-mail, spreadsheet, databases, presentation, Internet search engines). 1.4.2.

3 Verify compliance with security rules, regulations and codes (e.g., property, privacy, access, accuracy issues, client and patient record confidentiality) pertaining to technology specific to the industry pathway. 1.4.3.

4 Use system hardware to support software applications. 1.4.4.

5 Use information technology tools to maintain, secure and monitor business records. 1.4.5.

6 Use an electronic database to access and create business and technical information. 1.4.6.

7 Use personal information management and productivity applications to optimize assigned tasks (e.g., lists, calendars, address books). 1.4.7.

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8 Use electronic media to communicate and follow network etiquette guidelines. 1.4.8.

IT Fundamentals: Learners apply fundamental principles of IT, including the history of IT and its impact on society, common industry terms, systems theory, information storage and retrieval, database management, and computer hardware, software, and peripheral device configuration and installation. This base of knowledge and skills may be applied across the career field. 2

Outcome 2.1 **Security, Risks, and Safeguards: Describe the need for security and explain security risks and security safeguards.** 2.1.

1 Explain the need for confidentiality, integrity, and availability (CIA) of information. 2.1.1.

2 Describe authentication, authorization, and auditing. 2.1.2.

3 Describe multilevel security. 2.1.3.

4 Identify security risks and describe associated safeguards and methodologies (e.g., auditing). 2.1.4.

5 Describe major threats to computer systems (e.g., insider threats, viruses, worms, spyware, ransomware, spoofing, hacking, social engineering, phishing). 2.1.5.

6 Describe the components of the physical environment (e.g., wiring closets, server rooms) and physical security systems. 2.1.6.

7 Describe the need for security in networking (e.g., firewall, access controls, encryption, demilitarized zone). 2.1.7.

8 Describe the need for security in application development. 2.1.8.

9 Track and catalogue physical assets. 2.1.9.

10 Describe computer forensics, its importance in information security and cybersecurity, and its relevance to law enforcement. 2.1.10.

11 Identify the need for personal security in digital information and describe how personal information can be safeguarded. 2.1.11.

12 Practice information security per job requirements. 2.1.12.

13 Describe privacy security compliance on systems (e.g., Health Insurance Portability and Accountability Act [HIPAA], Payment Card Industry [PCI], Sarbanes Oxley Act [SOX], Americans with Disabilities Act [ADA], General Data Protection Regulation [GDPR], European Union Data Protection Regulation [EUDPR]). 2.1.13.

Outcome 2.2 **Networking Fundamentals: Apply networking fundamentals to infrastructure systems.** 2.2.

1 Differentiate between Local Area Networks (LANs), Wide Area Networks (WANs), Wireless Local Area Networks (WLANs), and Near Field Communication (NFC). 2.2.1.

2 Select the basic point-to-point (PTP) and point-to-multipoint (PTMP) network topologies (e.g., star, ring, tree, network, mesh, irregular) and broadband and baseband transmission methods. 2.2.2.

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3 Select network storage techniques (e.g., fiber channel, Internet Small Computer System Interface [iSCSI], Fiber Channel over Ethernet [FCoE], Serial Attached SCSI [SAS], Network File Systems [NFS], Network Attached Storage/Server Message Blocks [NAS/SMB]). 2.2.3.

4 Differentiate between the Internet, intranets, and extranets. 2.2.4.

5 Identify and apply Transmission Control Protocol and Internet Protocol (TCP/IP), Internet Protocol Version 4 (IPv4), Internet Protocol Version 6 (IPv6) applications and services (e.g., rlogin, Simple Mail Transfer Protocol [SMTP], Telecommunications Network [Telnet], File Transfer Protocol [FTP], Domain Name System [DNS], Network File System [NFS], Voice over Internet Protocol [VoIP], Internet Control Message Protocol [ICMP]). 2.2.5.

6 Differentiate between cable types (e.g., fiber optic, twisted pair, coaxial) and interfaces. 2.2.6.

7 Identify the top-level domains (e.g., .gov, .com, .edu). 2.2.7.

8 Describe the characteristics and uses of networks, network devices, and components (e.g., hubs, switches, routers, firewalls). 2.2.8.

Outcome 2.3 **Data Encoding: Explain and describe data encoding basics.** 2.3

1 Identify and explain coding information and representation of characters (e.g., American Standard Code for Information Interchange [ASCII], Extended Binary Coded Decimal Interchange Code [EBCDIC], Unicode). 2.3.1.

2 Convert between numbering systems (e.g., binary, hexadecimal, decimal). 2.3.2.

Outcome 2.4 **Emerging Technologies: Identify trending technologies, their fundamental architecture, and their value in the marketplace.** 2.4

1 Investigate the scope and the impact of mobile computing environments on society. 2.4.1.

2 Describe the differences, advantages, and limitations of cloud computing (e.g., public cloud, private cloud, hybrid cloud) and on premises computing. 2.4.2.

3 Utilize cloud computing applications (e.g., services, applications, virtual environments). 2.4.3.

4 Describe emerging technologies (e.g., Bring your Own Device [BYOD], Services Virtualization, Augmented Reality [AR], SMART Devices, Additive Manufacturing [3D Printing]). 2.4.4.

Outcome 2.5 **Maintain Operating Systems: Install and maintain operating systems (OSs).** 2.5.

1 Compare Operating Systems for computer hardware (e.g. personal computers, servers, mainframes, and mobile devices). 2.5.1.

2 Describe uses and functions of virtual machines. 2.5.2.

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3 Identify the properties of open and proprietary systems. 2.5.3.

4 Maintain file structures in an Operating Systems. 2.5.4.

5 Use system utilities to maintain an Operating Systems. 2.5.5.

6 Describe Operating System interfaces (e.g., command line, Graphic User Interface [GUI]). 2.5.6.

7 Install and test updates and patches to Operating Systems. 2.5.7.

Outcome 2.6 **Install and Configuration: Install and configure hardware and software.** 2.6.

2 Identify hardware requirements for software applications. 2.6.2.

3 Verify software compatibility and troubleshoot any software incompatibility. 2.6.3.

4 Install and test new software and software upgrades on stand-alone, mobile, and networked systems. 2.6.4.

5 Preserve, convert, or migrate existing data files to a new format. 2.6.5.

6 Determine compatibility of software and hardware and resolve any conflicts. 2.6.6.

7 Install and test hardware peripherals. 2.6.7.

8 Document installation, configuration, and compatibility of hardware and software. 2.6.8.

Outcome 2.7 **Web Architecture: Explain the fundamentals of delivering information and applications using web architecture.** 2.7.

1 Describe methods of securely transmitting data. 2.7.1.

2 Describe ways to present data (e.g., responsive web design, mobile applications, desktop applications, web applications). 2.7.2.

3 Differentiate between a client and a server. 2.7.3.

4 Identify how the use of different browsers and devices effects the look of a webpage (e.g., Americans with Disabilities Act [ADA]). 2.7.4.

5 Explain the relationship between data transmission volumes, bandwidth, and latency. 2.7.5.

6 Describe the characteristics and use of browser plug-ins. 2.7.6.

7 Compare the advantages and disadvantages of running an in-house server or using a service provider. 2.7.7.

8 Describe the difference between static and dynamic sites and the reasons for using each. 2.7.8.

Outcome 2.8 **Databases: Describe the fundamentals of databases.** 2.8.

1 Identify emerging database technology (e.g., Not only Structured Query Language [NoSQL], New Structured Query Language [NewSQL], graph databases). 2.8.1.

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. Describe the use and purpose of a database and a Database Management System (DBMS). 2.8.2.

3 Compare databases (e.g., flat file, hierarchical, relational). 2.8.3.

4 Describe the elements of a database (e.g., table, record/row, field, relationships, transactions). 2.8.4.

5 Describe the elements of a database user interface (e.g., form, queries, filters, reports). 2.8.5.

6 Describe Structured Query Language (SQL) 2.8.6.

7 Describe how data can be stored in and extracted from a database. 2.8.7.

8 Explain the importance of data integrity and security. 2.8.8.

9 Differentiate between a front-end interface and a back-end database. 2.8.9.

Outcome 2.9 **Project Concept Proposal: Develop a project concept proposal.** 2.9.

1 Identify and incorporate branding strategies. 2.9.1.

2 Determine the scope and purpose of the project. 2.9.2.

3 Determine the target audience, client needs, expected outcomes, objectives, and budget. 2.9.3.

4 Develop a conceptual model and design brief for the project. 2.9.4.

5 Develop a timeline, communication plan, task breakdown, costs (e.g., equipment, labor), deliverables, and responsibilities for completion. 2.9.5.

6 Develop and present a comprehensive proposal to stakeholders. 2.9.6.

Outcome 2.10 **Equipment: Select, operate, and maintain equipment.** 2.10.

1 Identify hardware platforms, configurations, and support models. 2.10.1.

2 Identify processor, memory, storage, power and environmental requirements. 2.10.2.

3 Identify architecture requirements. 2.10.3.

4 Identify software application requirements. 2.10.4.

5 Prepare and operate equipment per project design specifications. 2.10.5.

6 Monitor equipment operation and troubleshoot issues and problems. 2.10.6.

7 Backup, restore, test, archive, and manage data. 2.10.7.

8 Prepare equipment for storage or decommissioning. 2.10.8.

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9 Perform routine maintenance per manufacturer specifications. 2.10.9.

Outcome 2.11 **Troubleshooting: Select and apply troubleshooting methodologies for problem solving.** 2.11.

1. Identify the problem. 2.11.1.
2. Select troubleshooting methodology (e.g., top down, bottom up, follow the path, spot the differences). 2.11.2.
3. Investigate symptoms based on the selected methodology. 2.11.3.
4. Gather and analyze data about the problem. 2.11.4.
5. Design a solution. 2.11.5.
6. Test a solution. 2.11.6.
7. Implement a solution. 2.11.7.
8. Document the problem and the verified solution. 2.11.8.