"Requirements of developing commercial technical education in Egypt in light of digital transformation"

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Abstract

Digital transformation affects life, work and jobs at present and in the future. It imposes on educational institutions the necessity of introducing solutions to address its challenges. Commercial technical education is responsible for preparing its students to understand and deal with these transformations in order to get a job opportunity after graduation. Therefore, this research aimed to identify the requirements of developing commercial technical education in Egypt in light of digital transformation. It utilized the descriptive methodology. It dealt with the current state of commercial technical secondary education in light of SWOT analysis to identify strengths, weaknesses, opportunities and threats. It also dealt with the conceptual frameworks of digital transformation in commercial technical secondary education, such as digital business trends in the world including; mobile commerce, digital freelance work; e-services, crowd funding, electronic payments and Internet of Things (IOT). The theoretical results of the research showed the requirements of developing commercial technical education in light of digital transformation including; legislative, financing, administrative, infrastructure, societal and educational requirements as well as requirements of disseminating digital transformation literacy.

Keywords: Requirements - Developing - Commercial Technical Education - Digital Transformation

Introduction:

The Ministry of Communications and Information Technology has embarked on digital transformation and building Digital Egypt to keep pace with Egypt's Vision 2030. Building Digital Egypt is based on three main aspects; digital transformation, digital skills and jobs and digital creativity (Ministry of Communications and Information Technology, 2023). Commercial technical education is linked to the second aspect of Digital Egypt, which is digital skills and jobs. The nature of future jobs, for which students are prepared to work in, has changed. These jobs have become more complex, driven by digital technologies and most of them have been transformed into digital forms. So, job requirements have changed (Sollosy & McInerney, 2022).

Those seeking to join the future job market should develop their digital skills to succeed in a rapid and interconnected world. These digital skills include information and data

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processing, digital communications, digital content creation, and digital problem solving (Fleaca & Stanciu, 2019). Therefore, commercial technical education needs to be continuously evaluated to address the needs of the global business community and create more job opportunities for its students in the future.

A study by (Khan & Ali, 2022) attempted to explore the expected and actual return on investment of commercial education graduates in developing countries. The study concluded that introducing educational reforms related to developing innovative and technological skills can increase the return on investment of students. It also indicated the importance of redesigning curricula to make them more driven by the labor market.

A study by Amjad (2022) highlighted that commercial education graduates mainly lack skills in digital marketing, digital entrepreneurship, and how to use data and digital applications to identify and understand consumer behavior, although these skills are very necessary for future small and medium enterprises entrepreneurs to survive in competitive markets, improve economic growth and create job opportunities in both developing and developed countries.

Based on the above, digitalization is one of the most important priorities that should become a focus of interest of educational research as developments in the field of technology have created a global trend that seeks to disseminate digital knowledge as one of the most important modern trends in learning (Joosten et al., 2020). This is consistent with what Egypt's Vision 2030 emphasized that Digital Egypt aims to achieve knowledge-based growth and implement digital transformation, improve business environment, promote an entrepreneurship literacy, enhance the quality of government services and create a stimulating economic position capable of competing to attract international investments (Ibrahim, 2023)

Accordingly, it has become a must for educational institutions, including commercial technical education, to have a broader vision that enables the enhancement of digital skills learning and the improvement of the operational efficiency of administrative services provided to students, teachers, and society by digitalizing them (Porter et al., 2018). Therefore, digital transformation or digitalization can be considered a new trend in learning.

This means that developing curricula or modernizing commercial technical secondary education specializations to prepare its students for new emerging jobs that address the requirements of digital transformation is a major challenge. Developing this type of education in light of digital transformation has become inevitable. This is because commercial technical secondary education has a dual function; preparing for both life (the labor market) and higher education as it is a completion of an educational stage. Therefore, the Ministry of Education and Technical Education should pay great attention to this matter. These radical transformations require a comprehensive perspective of the aims of technical education in general and commercial education in particular in terms of its contents, methods and aids so that technical commercial education graduates are aware of all labor market needs. Many studies, including (Diwan, 2020, Muhammad, 2021, Shahada, 2022), have addressed the future of technical education in Egypt in light of modern technological transformations, addressing labor market needs in Egypt and linking technical commercial education to the requirements of Digital Egypt.

Problem statement:

Every learner needs a broad set of basic digital competences to adapt flexibly to a rapidly changing and highly interconnected world to find decent jobs and become a citizen involved in economic development plans. In 2006, the Council of the European Union introduced a framework of eight key competences for lifelong learning that included digital competences. It updated this framework in May 2018, acknowledging digital competences as one of the eight core competences that are vital for employment and effective citizenship. Its definition was updated to include emerging issues, such as robotics and artificial intelligence (Council of the European Union, 2006; European Parliament and Council, 2018).

The European Commission's Joint Research Centre (JRC) designed a framework for digital competence for citizens, first published in 2013 and updated in 2017, adding more than 250 new models of knowledge, skills and attitudes that help citizens engage confidently, critically and securely with new and emerging digital technologies such as AI-driven systems, virtual and augmented reality, robotics and the Internet of Things (Vuorikari, et al., 2019, Vuorikari, Kluzer and Punie, 2022).

Key Digital Competences are one of the most important requirements of Digital Egypt to restructure commercial technical education according to the requirements of the Egyptian and European labor market. They are defined as: "A combination of knowledge, skills and attitudes that individuals need to be able to use digital information and communication technology, such as desktop and laptop computers, mobile phones, and internet-connected or smart devices, to achieve their personal and career lives goals." Commercial technical secondary education focus on these competences enhances its ability to innovate, be productive, be competitive and address the requirements of globalization, structural changes in the labor market and the rapid development of digital technology.

The current state of commercial technical secondary education and the new context of digital transformation and its future possibilities have created challenges that have imposed on the commercial technical education system the responsibility to address and deal with them especially with expectations of an increase in the severity of these challenges in the future in terms of the developments and changes that the world is witnessing in various fields. So, this research aims to restructure commercial technical secondary education in light of the requirements of digital transformation as technical commercial education in its current state does not achieve global competitiveness for its students as a result of the problems it faces as revealed by recent studies (Hussein et al., 2022, Fouda, and Al-Ashry, 2022, Al-Hajri, 2021, Al-Salmouni, 2021, A, and Khalil, 2021). The most challenging problems are centered around the shortcomings of commercial secondary education curricula and specializations in integrating digital technology and its applications within curricula and linking it to specialized school subjects resulting in weakness of digital competences among students, and thus their inability to perform their future work and tasks when they join the labor market. Therefore, restructuring commercial education in light of digital transformation has its justifications as follows:

- **Digitalization of institutions and companies:** Digitalization of institutions and companies is the most important requirement for building a strong digital economy. Zhong & Ren (2023) found that digitalization can create favorable conditions for businesses to improve their

competitiveness. Therefore, most companies seek to respond to the rapid development of digital technology. Governments in all countries of the world also follow policies and procedures to implement digital transformation.

- **Cost control:** Digital transformation achieves savings in time and money in addition to speed of performance. It also breaks the barrier of space and restructures operation methods and management as digital transformation is constantly working to improve the productivity of the total real economy factors (Cheng, Zhou, & Li, 2023).

- **Knowledge explosion**: The current era is characterized by knowledge explosion as a result of communications and information technology revolution rapid scientific and technological development in the fields of life and the spread of knowledge and information in an unprecedented abundance. Therefore, knowledge has become a basic commodity that companies seek to obtain. There is a need for new labor force whose work nature, skills and competences differ. (Mashouh, 2022, 5). Thus, education in general and commercial technical education in particular is responsible for preparing workforce that addresses these requirements and is proficient in dealing with digital technology tools.

Globalization: Globalization is making changes in the forces of production through technological revolution. So, the world is moving towards a global market based on financial, technological breakthrough and economic revolutions characterized by reducing labor force and digital technology prevalence in markets and jobs (Al-Shali, 2021, 51). Perhaps, the future will witness more profound transformations than today. This consequently affects the type of skills that graduates need to be accepted for jobs in light of globalization for which commercial education should qualify them.

Enhancing competitiveness: The digital age has imposed digital transformation on all sectors to achieve growth and sustainability, especially with the expansion of the use of digital technology and its applications in implementing operations and providing available services (Qarziz, Zidane, and Al-Qattan, 2022, 376). Therefore, commercial education should improve the efficiency of its students to enhance their ability to compete in the local and global labor market, especially within the framework of digital commercial business as there is no room for the nationality of the person performing the work, as any individual can work in any international company without leaving his country. This has increased the competitiveness of jobs.

Research Questions

Based on the above, the current research seeks to identify the requirements of developing commercial technical secondary education in light of the digital transformation by answering the following questions:

1- What is the current state of commercial technical secondary education in light of SWOT analysis؟
2- What are the conceptual frameworks for digital transformation in commercial technical secondary education؟
3- What are the requirements of developing commercial technical secondary education in light of digital transformation in Egypt?

Conceptual Framework

The research explores three main aspects: the first deals with the current state of commercial technical education based on SWOT analysis, the second deals with the conceptual frameworks of digital transformation in commercial technical secondary education in Egypt and the third one deals with the requirements of developing commercial technical education in light of the digital transformation.

The current state of commercial technical secondary education

Commercial technical secondary education in Egypt is considered the minimum educational path for the Egyptian student according to the constitution that determines compulsory education for the state till the completion of the secondary stage. Commercial technical secondary education aims to prepare technicians in commercial fields in a way that enables them to understand the nature of various commercial transactions, the commercial work parties, its steps, and its commercial and legal effects on the transaction parties (Ministry of Education and Technical Education Portal, 2022)**.**

Divisions and specializations in commercial education

The structure of commercial secondary education in Egypt includes the following (Ministry of Education and Technical Education, 2022):

Three-year commercial secondary schools system	**Dual education system**	**Five-year advanced technical schools system(cancelled)**	**Notes**
▪ Secretarial Division ▪ Commercial insurance division ▪ Commercial transactions division ▪ Procurement and warehouse division ▪ Legal affairs division ▪ Hospitality	▪ Medical secretary ▪ Administrative assistant technician ▪ International transportation services ▪ Fast food technician(hospitality specializations) ▪ Tourism and hospitality ▪ Commercial specializations	▪ Banks division ▪ Secretarial Division ▪ Insurance division ▪ Ports management and maritime services ▪ Hospitality affairs and tourist services division	Five-year system was cancelled and limited to three-year system. So, specializations available at five-year advanced technical schools system should be restructured to suit three-year system

A SWOT analysis of the current state of commercial technical secondary education:

A. Strengths:

A-1. ***Private sector contribution to commercial technical secondary education schools:***

The number of public schools in commercial technical secondary education is (631) schools, while the number of private schools in commercial technical secondary education is (287), in a ratio of (31.26%) in 2021/2022. This is a satisfactory percentage which means that

the private sector can participate in the cost of developing commercial education as shown by the statistics of commercial education (Ministry of Education and Technical Education, 2022).

stage	private schools	public schools	Total
commercial	287	631	918

A-2.Literacy program for commercial secondary education students:

The Ministry of Education delivers a literacy program for commercial secondary education students and holds a level placement test for first-year commercial secondary school students every year before the start of the school year to determine their language skills and know their needs and requirements for the continuous development of this literacy program (Hawas, 2020).

A-3.Introducing professional competences system:

- Introducing a new educational system in commercial secondary education based on professional competences. It is a model for the comprehensive assessment that focuses on the student's three aspects of learning, including knowledge, skills and attitudes. It links curricula to the requirements of the labor market (Al-Muzayen, 2020, Al-Salmouni, 2021b).
- Commercial education programs based on competences included (4) programs: Sales Technician, Insurance Technician, Secretary Technician and Accounts clerks. (Al-Minshawi, 2018)
- Developing three programs for commercial secondary education based on the competences system in 2021/2022; Marketing and E-Commerce Technician, Data Entry Technician and Administrative Assistants.
- The competences system was applied to (29) commercial secondary schools till (2019/2020). (Ministry of Education and Technical Education, Technical Education Portal, 2022)

A-4.Applied Technology Schools:

Many applied technology schools in commercial secondary education have been established. These are model schools that implement international standards in curricula, teaching and training methods. These schools are characterized by implementing competences system and their curriculum consists of three basic components: basic and cultural sciences, technical sciences in the field of the specialization and hands-on training within companies. They are based on a partnership between the Ministry of Education and Technical Education and private sector companies. B-Tech School is considered the first applied technology school in the field of commercial education. It specializes in retail trade and was established in ElMoqatam, Al-Asmarat district. It was opened in 2020/2021 and accepted the preparatory certificate students from Cairo, Giza and Qalyubia governorates (Al-Minshawy, 2022).

B. Weaknesses:

B-1. Increase in the number of students in commercial technical secondary education:

Those enrolled in technical secondary education that have a preparatory school certificate are about 60%, while the number of commercial education students is 834,082 students, representing 41.5% of the total number of technical secondary education students in

2021/2022. This is a very high percentage as shown by commercial education statistics as follows (Ministry of Education and Technical Education, 2022):

stage	schools	classrooms	students
commercial	918	17571	834082

B-2. Type of students:

- The majority of students enrolled in commercial secondary education are students who got low marks in the preparatory certificate (50% or more), so it is necessary to know their abilities and develop curricula that suit them (Abdul Wahab, 2020).

B-3. Poor reading comprehension skills (Hawas, 2020):

-Poor reading comprehension skills among students in terms of the internationally defined reading literacy standards.

-Unclearness regarding reading program objectives and how to apply it to all students.

- Lack of teachers' and learners' guides to clarify reading comprehension skills that students need to develop at this stage.

B-4. ***Lack of schools implementing professional competences system:***

- A large number of commercial secondary schools have not implemented the competences system yet. They follow the traditional education system that has proven its ineffectiveness as its curricula are beyond applied practice and do not keep pace with contemporary trends in the labor market (Al-Minshawi, 2018, Al-Mazin, 2020).
- Lack of commercial secondary education teachers' readiness regarding the basic competences and skills they possess to be effective in the classroom according to the requirements of the competences system. Besides, competences, performances and tasks required from teachers according to this system are not sufficiently clear to them, whether by school or the educational managements which hinder the graduation of commercial education students who master the competences required for the labor market and are able to compete in it (Al-Minshawi, 2018, Al-Salmouni, 2021)
- (85%) of teachers use traditional teaching methods, educational aids, activities, and assessment methods with all students and follow the same traditional methods that were prevalent before introducing the competences system (Al-Salmouni, 2021).

B-5. In-service teachers' training:

The content of the training programs received by secondary commercial education teachers is prevalent by theoretical presentations, while hands-on aspect is rarely activated or practiced sufficiently to acquire the qualitative skills necessary for the competences system, especially (digital skills, knowledge management skills, effective classroom management skills, skills in using active learning strategies, and student assessment skills (Al-Minshawi, 2018, Al-Salmouni, 2021b).

B-6. Requirements for achieving quality and accreditation in commercial secondary schools in Egypt

Quality and accreditation requirements comprise: institutional capacity which includes five

aspects: requirements related to vision and mission, leadership and governance, physical and human capabilities, community participation, quality assurance as well as educational effectiveness which includes four aspects: requirements related to teachers, learners, school curriculum and school climate. The current state shows that schools have a vision and mission, although some schools need to develop them in light of digital transformation. Moreover, there is a weakness in other aspects. This weakness can be enhanced by school management and the formation of work teams that try to address the shortcomings and discuss the weaknesses with educational management to help improve them (Abdul Wahab, 2020).

B-7. Applied technology schools:

Commercial secondary education teachers' lack of teaching skills in applied technology schools to follow up hands-on training of their students as they are not used to the tasks and performances required in their field of work in teaching before. Besides, these tasks and performances are not clear to them sufficiently (Al-Minshawi, 2022).

B-8. Education system: (Khalil and Masil, 2020)

-High classroom densities.

- A large number of schools follow the shift system. Their number is (795) schools out of a total of (918), in a ratio of (86.6%) (Ministry of Education, 2022).

Full day schools	Morning schools	Evening schools	One, two or more shift schools	Total
123	266	383	146	918

- There is no link between what students learn and the labor market, especially in light of digital transformation.
- Lack of spaces available for training students, whether inside or outside school.
- There are many weaknesses and shortcomings related to career guidance and counseling system for students.

B-9. Poor productivity of commercial secondary school:

- Commercial secondary school is not a productive school like other types of agricultural and industrial technical education schools although digital transformation can help it in a productive one. (Khalil and Masil, 2020)
- The current state of the productive school in commercial secondary education in Egypt in light of digital transformation indicates that it has many problems such as; poor training, difficulty in tracking graduates and following them up in getting decent work despite introducing a unit in school called the Labor Market Transition Unit, lack of cooperation protocols among the types of productive schools, students' inability to adapt to the changing needs of the labor market, especially digital transformation, weak school management that should seek development, difficulty of providing appropriate funding for productive school projects, the scarcity of development processes for productive school curricula in line with the needs of the digital transformation and lack of training programs that care about productive school teacher. (Khalil and Masil, 2020)

C. Opportunities:

C-1. Real and actual digital competences:

In response to digital transformation, the European Council has provided a general framework for digital competences, which is being developed and updated continuously; especially after its piloting in 2018. If it is implemented in commercial technical education, it will provide opportunities for graduates of this type of education to work in local and global markets of a digital nature. Therefore, it is necessary to identify the real and actual digital competences that students of this type of education need to enter the labor market in general and the digital market in particular as well as exploring their real and actual importance in commercial technical education schools, the positive effects resulting from them, and methods of enhancing and developing them in commercial technical education schools. Digital competences include the following (ITU, 2018a, Vuorikari, et al., 2022):

Digital competence includes five areas:
Area 1: information and data literacy
Area 2: Communication, collaboration, joint work and interaction through digital technologies.
Area 3: Digital content creation
Area 4: Digital security and safety.
Area 5: Solving digital problems

Each area contains a number of sub-competences, levels of mastery, knowledge, skills and attitudes associated with each competency as follows:

Digital competence levels:

Each level of digital competence represents a step up in students' acquisition of competence according to the cognitive challenge and complexity of the tasks they can deal with and their independence in completing the task. Each level of proficiency takes into account several factors simultaneously:

- the student's level of familiarity with the proposed situation (basic, intermediate, advanced);
- the complexity of practices/applications using digital tools؛
- the degree of independence (with assistance, alone, share with others)؛
- the complexity of the procedures (application, development) and the goals to be achieved/accomplished؛
- the knowledge necessary/essential to implement them.

Digital competences are also classified according to proficiency levels into three levels: initial or foundational, intermediate, and advanced (ITU, 2015), as follows:

1. *Basic foundation level:*

Basic digital skills provide the foundation for using ICT. In some societies, all of these skills apply to mobile devices. Mastering basic skills requires working with several types of

devices. Basic skills include the following:

- Using a keyboard or touch screen to operate a device.
- Using software to download applications and create documents.
- Performing basic online operations such as conducting online searches, sending and receiving emails, and filling out forms.

These skills can be acquired by formal training, self-education or peer learning. Basic skills make it easier for individuals to communicate with others and access and use public and private services as defined by the International Telecommunication Union (ITU, 2018, a).

2. Intermediate level:

Intermediate skills enable individuals to use technology in more useful and meaningful ways. Unlike more general core skills, a person will need different sets of intermediate skills depending on their goals, needs and career. For example, depending on the type of job they have, a person may need digital graphic design skills in addition to word processing. As technology changes and grows, the number of skills that fall under the "intermediate" skill set continues to grow and expand. In the past, colleagues could only collaborate virtually by exchanging text over email, but now teams can collaborate using video, text, and audio devices across a variety of platforms. People generally acquire intermediate skills through formal education, peers, or through self-study (such as online courses).

Advanced Level:

ICT professionals use highly specialized and advanced skills in professions such as: computer programming, software development, data science, and network management, including:

- Artificial Intelligence (AI)
- Big Data.
- Cyber security.
- Digital Entrepreneurship.
- Internet of Things (IoT)
- Virtual Reality (VR).

These advanced skills are acquired through advanced formal education or through other paths; such as: coding training camps or online training.

C-2. Benefiting from* students *literacy program by enriching it with activities and exercises related to reading comprehension while benefiting from the PIRLS Test and its method of presenting questions and reading material (Naglaa Hawas, 2020).

C-3. Making use of free educational platforms and both Ministry of Education and Technical Education and technical education websites to provide training programs that focus on the qualitative and applied skills of commercial secondary education teacher in terms of the competences system (Al-Minshawy, 2018).

C-4. ***Benefiting from the mechanisms*** mentioned in Egyptian and global research and studies that dealt with improving the quality of commercial secondary education in terms of institutional capacity and educational effectiveness.

C-5. ***Making strong relationships with all local community organizations while linking school to the local community***; School can provide services for surrounding environment such as using the school yard as a summer club, as well as benefiting from the services of youth centers, sports fields, cultural palaces, and public libraries in supporting extracurricular school activities, especially there is a cooperation protocol between the Ministry of Education, cultural palaces, and youth centers (Abdul Wahab, 2020).

D.Threats facing commercial technical secondary education:

D-1. ***Private companies prefer Faculty of Commerce graduates***, especially their language programs due to their distinguished skills and abilities. Therefore these companies no longer have the desire to employ commercial technical secondary education graduates.

D-2. ***The unprecedented spread of e-commerce***, especially after the Corona pandemic, and the emergence of a large number of digital sales platforms instead of direct sales, which reduced the need to recruit employees to perform traditional commercial tasks.

D-3 ***The state's administrative body accumulation with employees***; so there is no urgent need in the near or far future for the annual numbers of commercial education graduates.

D-4. ***The spread of unemployment among commercial technical secondary education graduates*** and the increase in these numbers annually, especially with the increase in the number of its graduates every year.

D-5. ***The high cost of this type of education*** relative to the expected economic return from it as schools, teachers, textbooks and budgets are provided for activities and laboratories, but the expected return is an increase in the number of unemployment among its graduates.

Conceptual Frameworks for Digital Transformation

Digital revolution has changed patterns, possibilities and active institutions of world trade. It is opening opportunities for millions of micro entrepreneurs and small businesses to engage in cross-border trade. It is also enabling companies of all sizes to make, move, and market products and services faster and at a lower cost than ever before. It is accelerating trade transactions worldwide by making all of it happen digitally via the internet. This provides opportunities for new gains to emerge as a result of digital transformation in trade, whether for companies or consumers, in addition to internationalizing projects and stimulating productivity and growth (Suominen, 2017).

Digital transformation has become an important trend. Digitalization has become a basic step and not a luxury as countries around the world are moving to benefit from its technologies to automate and digitalize government services; to facilitate citizens' lives on one hand and increase transparency and accountability rates at the other hand. Digital transformation came on the list of priorities of the Egyptian government. This has led to a boom in the communications and information technology market and the digital services provided by the state. The government encouraged emerging technology companies in addition to a boom in technological financial services (Information and Decision Support Center, 2022). This research addresses the conceptual frameworks of digital transformation

with the aim of identifying **the requirements of developing technical commercial education** in light of it, as follows:

The digital economy shapes the trends of consumption, production, distribution and utilization of resources at present and in the future. Digital trade markets are practical models of the characteristics of the digital economy system. There are major trends that support smart business models, represented in emerging technology models such as artificial intelligence, the Internet of Things, big data, data analysis, machine learning, mobile applications, and the Internet (Abeba, 2020). Some studies have indicated the top six trends that have an impact on work in digital aspects, represented in the following (APEC Business Advisory Council, 2017) :

1- Mobile Commerce, a subset of e-commerce, offers capability to buy and sell via mobile services through wireless technology.

2- Digital Freelance Work; The changing nature of labor markets, demographic changes, and new technologies have resulted in new forms of work such as: digital freelance work and remote work, in addition to the emergence of digital nomads, who are described as professionals and innovative entrepreneurs. The rapid developments in Wi-Fi services worldwide, co-working spaces and the spread of portable laptops and tablets have led to an increase in the number of digital nomads (ILO, 2016).

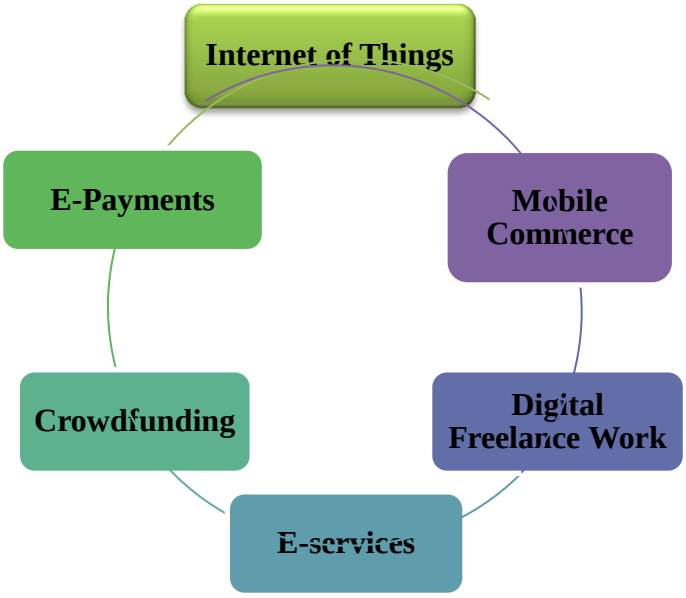
3- E-services: These are performances delivered digitally, primarily through the internet. According to UNCTAD, several types of e-services have emerged, such as: companies' services with each other, companies' services with consumers, and consumers' services with each other.

4- Crowdfunding is a technique for raising external finance via the internet from multiple individuals. The industry has been growing since the mid-2000s, but represents a minor share of business financing. In 2015, its worth was estimated at USD34 billion, with expectation that emerging economies will significantly contribute to further growth.

5- E-Payments: E-payments are e-wallets, credit cards, and mobile devices. They are on the rise as they are a convenient alternative to cash-based models and digital money transfers via applications or digital banks.

6- Internet of Things (IoT) is an integral part of electronics, software, sensors and network connections with machine-to-machine capabilities. It will be a defining feature of the future digital economy in the future. Devices span from smart phones, watches, smart televisions, and personalized household goods to advanced industrial and agricultural capabilities with potential to transform various economic sectors; such as: health care, infrastructure and public sector services. The effective use of the Internet of Things in the economy depends largely on the laws regulating all economic sectors with a close link between communications and information technology and communication networks for data protection and competition policies (APEC Business Advisory Council, 2017).

Global digital business trends can be represented as follows:



Requirements for developing commercial technical education in light of digital transformation

Based on the above, developing commercial technical education in light of digital transformation requires facilities and requirements that must be provided to do so. This requires considering development from all aspects and integrating digital skills into commercial technical education curricula. This needs the availability of many requirements as follows:

- ***Legislative requirements***: They aim to provide the necessary facilities for digital transformation and qualify operating systems and staff to deal electronically as follows:
  - The need to amend some laws and regulations related to commercial education admission system to keep pace with the development of its new digital specializations.
  - Introducing a plan to implement the necessary policies and regulations to develop commercial secondary education in order to achieve the requirements of digital transformation and the future jobs that its graduates will join.
- ***Financing requirements:*** They aim to provide the necessary funds to achieve the desired goals, the following must be taken into account:
  - Providing financial allocations to spend on developing commercial technical schools in light of digital transformation.
  - Activating the role of the private sector in supporting development and change processes.
  - Increasing commercial education budgets to provide the necessary funding for development and digital transformation.

Administrative requirements: (Langthaler & Bazafkan, 2020)

Digital transformation requires a modern and flexible organizational structure and administrative leaderships aware of it to strengthen and support the process of developing this type of education. To achieve this, the following must be taken into account:

- Employing experts and trainers outside school to train and educate students about the digital skills and jobs that society needs.
- Providing a modern, complete and clear information base about digital specializations and jobs that have emerged as a result of digital transformation.
- Holding awareness and guidance seminars to disseminate awareness of digital labor market jobs among commercial education students.
- Changing education and learning systems to provide new skills and future human cadres capable of achieving excellence at work in light of digital transformation. Quantitative indicators also confirmed the Egyptian state's keenness to implement digital transformation strategies as one of the main pillars of the Egyptian entrepreneurship environment, investing in the digital economy in Egypt and raise the efficiency of the digital sector in a way that can address the digital gap between Egypt and the developed world according to specified standards. Besides, there is a positive relationship between implementing digital transformation mechanisms and enhancing economic growth in Egypt.

- ***Infrastructure requirements:*** (UNESCO-UNEVOC, 2020a), (Abdul Hafeez, 2021)

Developing countries should focus on establishing information infrastructure to integrate into the digital transformation according to the United Nations Association for Science and Technology for Development. So, the following must be available:

- Providing digital infrastructure in school environment such as modern and advanced digital devices that are compatible with digital transformation to develop human resources and apply modern digital skills in teaching, learning and training processes.
- Providing advanced computers, programs and applications that ensure educational system persistence in a way that achieves efficiency in service performance in light of integrated communications infrastructure and information systems as well as developing appropriate training programs.
- Developing educational institutions as the success of implementing digital transformation requires making continuous organizational changes and taking into account flexibility and speed in decision-making.

- ***Community requirements:*** (Abdul Ghani, 2022, Al-Haddad, Ibrahim, 2021)

The most important community requirements for achieving digital transformations in Egypt are as follows:

- Making cooperation agreements and protocols between commercial education schools and the business sector (private - public) in developing digital

educational and training programs for commercial education students that are compatible with their future jobs in light of digital transformation.

- Providing communication channels between commercial education schools and civil society institutions (private - public) to provide the necessary human resources to work in various digital jobs.
- Encouraging business sector companies (private - public) that have adopted digital transformation to open classes to teach and accept commercial education students to study in specializations needed by the digital labor market.
- Establishing a partnership between production and service institutions and business owners to provide school environment with the necessary digital technologies to provide hands-on training to provide students with digital skills related to the requirements of Digital Egypt.
- Making partnership agreements between commercial technical education schools and the Ministry of Communications and Information Technology and local and international companies in order to participate in developing curricula and training teachers and students on the necessary digital competences.

- ***Educational requirements:*** These include requirements for the teacher, the learner, requirements for designing new educational programs and requirements for creating new digital specializations in light of digital transformation.

- **Requirements for teachers:**
  - Providing commercial education teachers with continuous up to date digital training programs in new digital specializations.
  - Conducting transformational training programs for teachers' specializations that are not suitable for digital specializations and jobs in a manner consistent with the specializations and requirements of Digital Egypt.

- **Requirements for Learners:** (APEC Business Advisory Council, 2017)
  - Developing commercial education students' skills of applications and electronic services to transform towards a digital society.
  - Devising training programs to integrate industrial, agricultural and hospitality education with commercial secondary education to give a collaborative digital nature.
  - Providing the opportunity for transformational training programs for commercial education graduates.
  - Encouraging commercial technical education students to digital innovation to achieve high-quality economic growth.
  - Possessing digital and communication skills; so that the learner is able to identify technology creation methods of new opportunities and business models, and innovating new means to implement current tasks.

- Commercial technical education students have the ability to communicate digitally with banks and investors to get a project financing and have the ability to innovate, improve and manage change.

- **Requirements for designing new educational programs:**

Many Arab and global studies have indicated the significance of reviewing curricula and training programs in commercial technical education to enable students to understand modern digital technologies that the society needs in light of digital transformation and to realize the fast-paced changes in the requirements of digital jobs. Therefore, attention must be paid to the following (Abeba, 2020, Al-Batsh, 2019, Hanfy, 2016, 9, Naudé, 2017):

- Specialized digital skills, including the skills required for production, management, marketing, sales, and management of software and information and communications technology systems.
- Digital work skills, including; digital commerce, digital leadership and digital entrepreneurship skills in addition to technological literacy.
- Skills for dealing with digital libraries and databases in any specialization.
- Digital work trends represented in emerging technologies such as: principles of artificial intelligence, the Internet of Things, big data, mobile phone applications and the Internet.
- Developing and devising modern digital educational specializations and programs in line with the requirements of Digital Egypt, while canceling specializations that are not compatible with the current labor market.
- Including value dimensions and ethical, professional and community awareness in curricula and study programs in line with the requirements of digital jobs.
- Focusing curricula on using emerging digital technologies to provide the workforce based on the requirements of Digital Egypt.
- Reviewing digital educational programs, specializations and syllabi every five years to become more suitable for the requirements of Digital Egypt and address the digital labor market needs.
- Introducing issues such as cybersecurity, combating cybercrime, Internet crimes, laws regulating digital trade transactions and focusing on technical research and development to address the digital gap.
- Building capacities and expertise in the field of e-commerce applications, supporting innovation and entrepreneurship in the field of financial transactions of e-commerce online and via mobile phones.

- **Requirements for creating new digital specializations in light of digital transformation:**

The shift to digital technology has become a priority. Many digital jobs, which did not exist before, have emerged. Commercial technical secondary education graduates can work in these jobs. Therefore, it is proposed to create modern digital specializations in commercial technical education that keep pace with the requirements of future jobs suitable for its graduates in light of digital transformation in some of the following fields:

- **Big Data (Data Science and Automation):**

It includes a commercial technician to work in the field of big data in terms of the techniques related to the value and ethical aspect of saving and using data, as well as working as credit agents in the field of data and data brokers.

- **Internet of Things technology(IOT):**

It includes monitors of alarm systems that operate according to the principle of the Internet of Things and data security as well as a technician assessing points of failure according to the principle of the Internet of Things.

- **Blockchain technology:**

It includes a technician in the field of blockchain and blockchain user interfaces and experiences and blockchain cloud applications, an analyst of blockchain systems and products and technicians to develop blockchain-related businesses.

- **3D printing:**

It includes 3D printing technicians and 3D printing operators.

- **Crypto currencies:**

It includes banking technicians and specialists in transactions related to electronic currencies, technicians in the insurance sector for electronic currencies, technical employees for electronic currency exchange operations and analysts for electronic currency performance.

- **Digital marketing:**

It includes technicians specialized in digital marketing via social media, websites and various commercial platforms to support e-commerce and make products accessible to a wider range of society.

- **Shipping and unloading sector:**

It includes technicians specialized in shipping and unloading to facilitate communication and delivery of goods and services and make them accessible to a wider range of people.

- **Digital communication jobs:**

It includes technicians specialized in digital communication with customers via various digital communication media to facilitate responding to their inquiries and providing them with technical support.

Requirements for disseminating digital transformation literacy: (UNESCO-UNEVOC, 2020b), Abdel-Ghani, 2022)

This requirement is one of the most prominent modern trends to achieve digital transformation in Egypt by the physical dimension of technologies and the ethical dimension of preserving them and respecting intellectual property. Digital transformation literacy includes the following:

Firstly: Digital literacy skills, including digital skills, which start from basic skills to advanced skills. They include; the skills required for the effective use of information and communications technology devices and cover user skills; employing the Internet, basic and advanced applications and software and specialized devices that support specific functions at work or a project as well as covering basic skills, digital literacy skills and digital information literacy in addition to the following elements:

- Fostering a sense of the need for change towards digital transformation.

- Forming a media team to disseminate digital transformation literacy.
- Raising awareness of the trends and challenges of digital transformation in the labor market.
- Conducting literacy courses on the importance of digital transformation in education in general and commercial technical education in particular.
- Financial and digital literacy and mainstreaming financial inclusion within the state and building consumer confidence in digital financial services provided that products are simple and designed to meet the needs of users.
- Paying attention to disseminating technical awareness in educational and academic institutions and modernizing educational curricula in line with the technological environment, paying attention to the human resources, adopting a literacy policy and integrating technological awareness into the institutional culture of the state and transforming it into a reality that citizens live by enhancing the use of modern applications and information technology, especially in government bodies, such as block chain technologies, artificial intelligence and the Internet of Things to save time and effort and improve the level of service.

Providing education, training, guidance and awareness programs on digital transformation by the Ministry of Education websites through:

- Disseminating the concept of digital literacy.
- Clarifying the impact of digital literacy.
- Highlighting digital literacy and its role in the educational process.
- Benefits of digital literacy.
- Negative effects of digital literacy.
- Measuring and evaluating digital literacy.
- Means and methods of improving digital literacy.

Secondly: General digital skills for technical and commercial education graduates:

Digital competence includes five areas. Each area contains a number of specific sub-competences, levels of proficiency, knowledge, skills and attitudes associated with each competence, as shown below:

1- The first area: Information and data literacy through:

1.1. Browsing, searching and sorting data, information and digital content through the ability to:

- Create search strategies for information in the professional specialization.
- Surf the Internet, noticeboards and news on webpages related to the specialization.
- Search online for information, data and digital content for the professional specialization.
- Select professional digital resources effectively.
- Be familiar with search engines, repositories, specialized sites, etc., so that they can find useful information for their professional specialization.
- Share professional resources in the cloud to manage their permissions as needed (for example, read, comment and edit permissions...etc).
- Integrate different technologies for transferring files (for example, using Google Drive, SharePoint, Dropbox, FTP...etc).

- Participate in a professional network to exchange resources and information useful to the professional specialization.
- Make continuous development by constantly reviewing the criteria for evaluating the quality of professional resources online.

1.2 Evaluating the reliability of data, information and digital content critically.

1.3. Managing, storing and retrieving data, information and digital content critically.

2. The second area: Communication, collaboration and joint work through the following digital technologies:

2.1. Participation through digital technologies by improving the ability to interact on the web through multiple digital devices.

2.2. Joint work through digital technologies, such as:

- Sharing information and digital content with classmates, teachers and school management.
- Using applications and collaborative workspaces in practicing professional specialization.
- Collaborating with other classmates through digital channels.
- Organizing professional projects online as a means of collaboration among students, teachers and school management.

2.3. Commitment to digital ethics by:

- Having knowledge of the code of conduct and respecting privacy and cultural diversity when using digital devices.

2.4. Managing digital identity by:

- Having and managing a digital identity (for example: having a public profile on the social network with his real name and photo).
- Applying digital identity protection protocols in all professional specialization initiatives.
- Preventing and detecting cyberbullying and other violations that may occur online.

3. The third area: Digital content creation through the ability to:

3.1. **Develop digital content through:**

- Creating digital content in different formats.
- Developing and maintaining digital spaces dedicated to professional practice (e.g. professional blog, project sites, etc.).

3.2. Integrate and re-formulate digital content through:

- Adapting and integrating digital content into the professional specialization.
- Collaborating in the creation of open digital resources among classmates, teachers, different technical specializations and school management.

3.3.Copyrights and licenses through:

- Commitment to getting a license to participate in forums or seminars related to the professional specialization.

3.4. Programming through:

- Searching for solutions to computer operations, programming or digital technology independently online.
- Making changes to settings, programs and applications

4. The fourth area: Digital security and safety through the ability to:

4.1. Protect digital devices and content.

4.2. Protect personal data and privacy on the network and the responsible use of technology in the workplace.

4.3. Protect health and well-being through the ability to:

- Set practice restrictions on workplace projects related to risks arising from the use of digital devices, tools and services in the cloud (for example, regarding hacking, bullying or cyberbullying).
- Practice healthy digital lifestyle habits.
- Achieve a balance between online and offline life.

4.4. Preserve the environment through the ability to:

- Apply strategies to preserve the environment from the impact of technologies.
- Raise awareness about the sustainable use of technology.

5. The fifth area: Solving digital problems through the ability to:

5.1. Identify and solve technical problems in digital devices and services in the professional specialization.

5.2. Identify technological needs and responses through adapting digital tools, services and resources to professional needs (for example, using public social networks such as Facebook to create support groups for professional specialized projects).

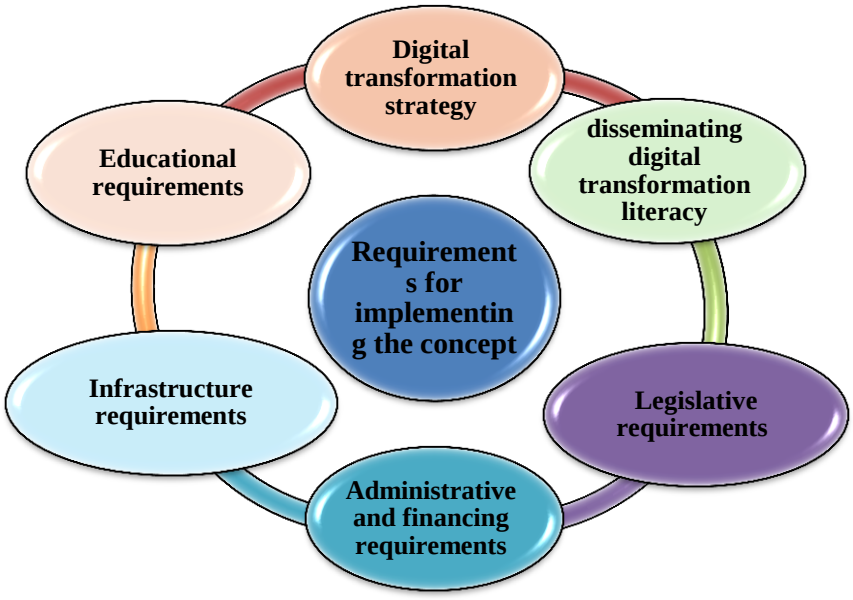
5.3. Assess classmates' needs critically to enhance their digital competence to provide creative solutions.

5.4. Identifying gaps in the digital competence by:

- Identifying the learner's gaps and weaknesses in digital competence.
- Using the network to identify continuous professional development opportunities that help improve the learner's digital competence.

Requirements for implementing the development of commercial technical secondary education in light of digital transformation:

These requirements are determined as shown in the following figure:



Research Methodology:

This research utilized the descriptive methodology, as it dealt with the literature related to the research aims by analysis and discussion within a framework aimed to formulate the requirements of developing commercial technical education in light of digital transformation.

Discussions/ Implications

The environmental analysis of commercial technical education in Egypt showed that there are many strengths, weaknesses, opportunities and threats. The strengths are the private sector's contribution to technical commercial education schools, the implementation of a literacy program for commercial technical education students, the professional competences system, and the establishment of applied technology schools. The weaknesses are the increase in students' number in commercial technical secondary education, weak student capabilities, poor reading comprehension skills, few schools that apply the competences system, poor in-service teacher training, poor quality and accreditation requirements, shift system, and weak productivity of the commercial secondary school. The opportunities are actual digital competences, Egypt's investment map, benefiting from the reading program, exploiting free educational platforms, Egyptian and foreign research and studies, and linking the school to the local community. The threats are the preference for graduates of faculties of commerce, the spread of e-commerce, the spread of unemployment among graduates, and the high cost of commercial technical secondary education.

The research discussed the conceptual frameworks of digital transformation in light of which secondary technical commercial education can be developed in Egypt and dealt with the role of the digital revolution in global trade; as it provides opportunities for many job opportunities for millions of entrepreneurs and small projects, develops industry, transfers and markets products in a faster and cheaper way and accelerates business processes worldwide. The research also dealt with digital business trends in the world; mobile commerce, digital freelance work; e-services, crowd funding, electronic payments and Internet of Things (IOT). The research also discussed a variety of requirements necessary to develop technical commercial education in light of digital transformation, represented in legislative, financing, administrative, infrastructure, societal and educational requirements as well as requirements of disseminating digital transformation literacy.

Conclusions

The research concluded with a proposed vision for developing commercial technical education in light of the requirements of digital transformation based on several pillars, including: selecting commercial technical education schools according to commercial activities and economic diversity in the surrounding environment, assessing the readiness of commercial schools for digital transformation, applying the professional competences system, especially digital competences, and creating programs and specializations that suit digital transformation, such as; artificial intelligence applications, logistics, cybersecurity, the Internet of Things, digital entrepreneurship, digital marketing, electronic crypto currencies, 3D printing, and blockchain technology through optimal use of free educational training platforms, and training technical commercial education students by the Ministry of Communications and Information Technology.

The research also concluded that the success of the proposed vision of developing commercial technical education in light of digital transformation requires the availability of a set of guarantees, including: developing a strategy for digital transformation, disseminating

digital transformation literacy and an integrated system for the infrastructure of digital learning, setting scientific standards and policies that support digital content, building human capacities and cadres in the field of digital content and producing and using digital content, activating the role of the private sector in supporting development and change processes, eliminating all forms of bureaucracy that hinder change processes, forming a media team to disseminate digital transformation literacy and enhance community participation, coordination and cooperation between the relevant ministries, and adopting the community school model.

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