Contribution of education to digitalization and health: evidence from GCC & MENA countries

Doaa Salman Abdou
Head of the Economics Department of Economics,
Faculty of Management Sciences, October
University for Modern Sciences and Arts
https://orcid.org/0000-0001-5050-6104

Mai Yasser
Department of Economics,
Faculty of Management Sciences,
October University for Modern Sciences and Arts
https://orcid.org/0000-0002-2067-8113

Abstract

This paper explores the impact of digitalization and health on education in the GCC and MENA countries. The study tries to answer the question what is the impact of digitalization and good health on the demand of education in both gulf countries and the Middle East countries using the ARDL model. The empirical results show that education impact varies in both countries, results support the literature as population growth represents pressure on developing countries that are characterised by low and middle-income levels. Also, high-level income countries show a positive and significant impact on economic growth and health in education. While MENA countries show a negative and

significant impact on economic growth and life expectancy on education. Findings imply the need for more restructuring of infrastructure and the adaptation of new technology in the region.

Keywords: Education, Health, digital and Economic growth
Jel Code: A2, P3, N7, O47

تأثير الرقمنة والصحة على التعليم: حالة دول مجلس التعاون الخليجي ودول الشرق الأوسط وشمال أفريقيا

الملخص

تستكشف هذه الورقة تأثير الرقمنة والصحة على التعليم في دول مجلس التعاون الخليجي ودول الشرق الأوسط وشمال إفريقيا. تحاول الدراسة الإجابة على السؤال: ما هو تأثير الرقمنة والصحة الجيدة على الطلب على التعليم في كل من دول الخليج ودول الشرق الأوسط التي تستخدم نموذج ARDL. تظهر النتائج التجريبية أن تأثير التعليم يختلف في كلا البلدين ، والنتائج تدعم الأدبيات حيث يمثل النمو السكاني ضغطًا على البلدان النامية التي تتميز بمستويات الدخل المنخفض والمتوسط. كذلك ، تُظهر البلدان ذات الدخل المرتفع تأثيرًا إيجابيًا وهامًا على النمو الاقتصادي والصحة في التعليم. بينما تظهر دول الشرق الأوسط وشمال إفريقيا تأثيرًا سلبيًا وهامًا على النمو الاقتصادي ومتوسط العمر المتوقع على التعليم. تشير النتائج إلى الحاجة إلى مزيد من إعادة هيكلة البنية التحتية وتكييف التكنولوجيا الجديدة في المنطقة.

الكلمات المفتاحية: التعليم ، الصحة ، النمو الرقمي والاقتصادي.

1- **Introduction**

Digitalization and COVID-19 reflects significantly on many countries. The well prepared and equipped countries sustain longer during uncertainties. Therefore, great attention was given to technology and how to use the new digital techniques in education and access to health. ICT paves the way to efficient use of resources as the economic theory argues so (Leonardi, 2011) found that individuals should be flexible to the use of technology and countries also should update their resources to fit with the continuous new technology. This technology will enhance access to health and education and thus economic growth will be achieved (Njoh, 2018).

The link between education and health is well established in the literature as they are regarded as ingredients for each other. Higher education means lower mortality rates (Silventoinen & Lahelma, 2002). Scholars studied the link between health and education in the sense of inequality and access to both services, but to link them to technology and digitalization is rare (Cavelaars, et al., 1998). Furthermore, in 2018, Palvia, et al studied the role of ICT in the frame of social and economic impacts and how it may affect education and health in Pakistan. Moreover, in most literature, the link between education and health was used as two components of the three components of human capital theory that were health, education, and training (Ogundari & Awokuse, 2018). In this study, the role of ICT was absent as the main concern was for the skilled labour in both sectors without any mention of how to reach these skills. The main objective of that paper is to study the impact of education

and health on economic growth in the light of ICT in the short run and long.

The paper main research problem s to examine the role of digitilization and health on education as lthe literature shows the gap between countries. And limited studies investigates this problem.

This paper will be divided into four parts, as the first part will be theoretical, studying the literature review. Then the second part will study the data trends in health and education generally in the world and especially in MENA regions. The third part will be a practical studying the methodology and the last section discusses the results. Then it will end with the conclusion.

2- Literature review:

In 1956, Solow found that some variables affect growth in the short-run and the long run as technology and how to use it efficiently. After a lot of modifications to his growth model, he concluded that growth is affected by education, health, and other variables such as technology and trade openness (Tiwari & Mutascu, 2011). To study the relationship between education, health, and digitalization, the theory of human capital arose (Sweetland, 1996). This theory aimed at investment in individuals, especially in nutrition, education, and health (Schultz, 1981). Therefore, Human capital refers to the development of habits, skills, resources, and capabilities that helps individuals to reach a better life (Mirowsky & Ross, 2007). More Education will increase the stock of human capital and its productivity which will end in higher income to ensure a better life. Education affects mental health as it may overcome feelings

of helplessness as well as physical health (Williams & Chiquita, 1995). Thus, education affects the productivity of labour while health affects the performance and efficiency of that production (Ada & Acaroğlu, 2014). Empirical findings offer compelling evidence for the importance of human development to enhance business development and growth in nations (Salman, 2016) that value innovation. But what is recognized is that no theory tried to connect education and health to digitalization.

Few studies examined the relationship between life expectancy, education, and digitalization. Therefore this paper will divide the literature review into 3 parts the first one will study the relationship between education and technology. While the second part will tackle literature dealing with technology and life expectancy, the third one will merge the three in the study. In testing the relationship between technology and education, (Kumar, 2018) found that the relation between technology and education can be explained by depending on some variables such as the use of the internet, digital footprint, and visual tools to avoid educational obstacles such as time, resources and support (Ng, 2015). By depending on these tools, all countries can access education regardless of the available resources by depending on online education and other integrating learning systems such as e-learning (Hamidi, et al, 2011) and LMS. Heavily depending on IT in education will lead to increase self-confidence and self-esteem. Most of the literature examined the relationship between education and technology– whether in classroom or online learning-concluded that technology acts as an important catalyst for education without studying its efficiency or effectiveness on the student (Kadiyala, 2000). A recent studies shows that education and using digitalization significantly affect female job

opportunities but in the long run as well higher education plays a crucial role to foster the effect of digitalization (Salman et. al, 2020; Soliman, & Salman, 2022).

There are many obstacles to applying technology in the field of education. One of these obstacles is teachers that education depends on the teacher in the delivery of information to students. Thus, the teacher should know how to deal with IT in the current era, which will increase the fees of training for teachers to deal with technology in education (Christensen & Knezek, 2001). Scholars show that many barriers to the use of technology by teachers appeared as resistance to the use of technology and the lack of funding and timing (Fabry & Higgs, 1997).

In examining the gap between life expectancy and education, inequalities were the key that was used in many works of literature as the mortality rate was obvious in most studies dealing with Europe (Mckenbach, et al., 2016, Mackenbach, et al., 2008). This gap was increasing in Western Europe more than the eastern one, as Western Europe with high educational levels was characterized by high life expectancy in the long term. This was explained by the decrease in respiratory, circulatory, and cancer diseases (OECD, 2018; Parez, et al, 2022).

Well-educated people are characterized by low unemployment rates that are accompanied by high-income rates that end with a better healthy lifestyle (Ross & Wu, 1995). Therefore, the increase in the number of schooling years will lead to better health (Cutler & Lleras-Muney, 2006) as it will increase income and access to different resources that enhance access to information and critical thinking means that will end with trusting the science and new technology and finally the happiness (Blanchflower & Oswald, 2004). Also, the increase in schooling

years and the improvement in the quality of education may affect the usage of medical drugs and tools to decrease waste and increase efficiency (Leigh, 1983).

Limited studies investigate the relationship between digitalization, education attainment and health in the era of COVID-19 as (Chaturvedi, et al, 2021) found that the use of e-learning (sort of digitalization) will decrease stress and other mental diseases and enhance the accuracy of education by students comparing to those with special needs or disabilities who suffered from loneliness and worry as they felt that they were excluded from the society (Asbury, et al, 2021). (Ogundari & Awokuse, 2018) found that there is a positive relationship between economic growth on one side and health and education on the other side in sub-Saharan countries. Regarding the MENA region, only one piece of literature studied the link between these three variables but within the context of population growth rate. (Adeleye, et al , 2022) found that there is a positive impact of education and health on economic growth in MENA if there is a positive population growth rate.

Therefore, this study will examine the relationship between digitalization, education attainment, and life expectancy in the MENA region, especially after the increase in educational levels all over the world and the huge provision of pandemics such as COVID-19. Through the literature review, limited ones tackled the link between education, health and digitalization and especially in MENA. Therefore, the authors gave more attention to the MENA in these aspects and tried to fill the gap. Also, they tried to study the impact of digitalization on education and health and therefore economic growth.

3- International Digital Education and health:

Education is recognized as one important source of investment in human capital (Chapman & Miric, 2009) especially in the era of pandemics of COVID-19 as many institutions and countries depended heavily on technology and many software systems and applications to prevent the wave of education in the world as well as MENA. The countries in that region have many historical and cultural variations with an aim of increasing the provision of education and health (Welmond, 2006) besides the increase in the use of technology in different fields. School enrolment is used in studying education as one of the variables that show the improvement of education, especially in developing and MENA region countries. This indicator is considered the lowest in the world regions as the Euro region comes first, and the MENA comes last as shown in figure one.

Figure 1: School enrollment in different regions
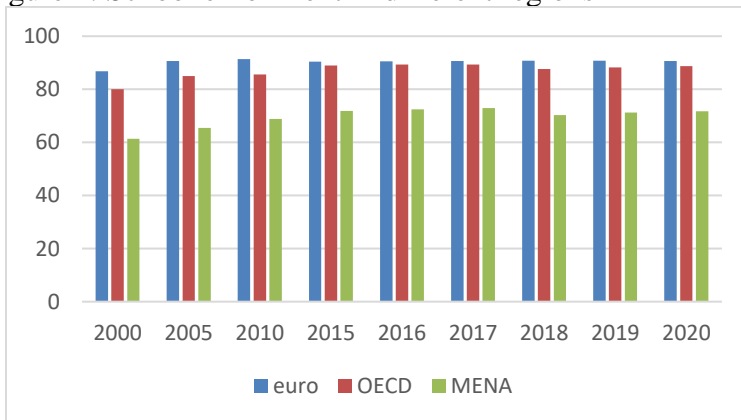
Source: done by the researcher depending on World Bank data

Recent data provided by the World Bank shows that life expectancy – as a proxy for health- has increased by 7.2% from 2000 till 2020 which is approaching the international life expectancy that increased by 7.7% in the same period as shown in figure 2 as a result of the increase in the health expenditures and the providing of different vaccines and treatment to all citizens in the region.

Figure 2: Life expectancy in MENA
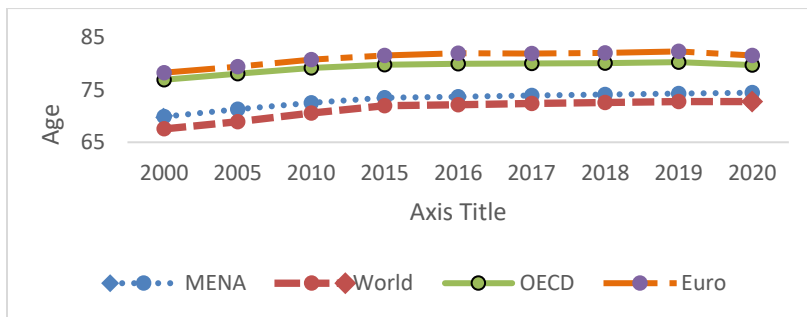
Source: World Bank data (2022)

4- Methods & Data

The data is considered panel data that combines both the time series data and cross-sectional data. As these panel data have heteroscedasticity and stability problems, so we will conduct various tests to avoid these problems. The analysis began with testing the stationarity of the data by using a unit root test for ADF, & PP to determine the degree of integration. The test will be done by the time-series data for each one of the two groups. According to (Enders, 2004), if Y=0, then we will depend on the

first difference, and it means that we have a unit root. Y is estimated through equation one.

$$\Delta Y = a_0 + +Yy_{t-1} + \sum_{i=2}^{p} \beta \Delta y_{t-i+1} + \epsilon t \dots \text{Equation 1}$$

In step 2, we will perform Johnsen`s cointegration test then a panel least square will be conducted then finalize with the ADRL test.

This paper depended on some variables were school enrollments as a percentage of total population (Y), cell subscribers per 100 people C_SUB, cell subscribers per 100 people POP, life expectancy EXP, fixed broadband subscribers per 100 FIX_SUB, and GDP growth rate GDP. All of these were extracted from World Bank as listed in table 1.

Table 1: List of variables

Variable	Symbol	Source	Expected sign
School enrollments as a percentage of the total population	**SKL**		+
Cell subscribers per 100 people	**C_SUB**	**World Bank indicator**	+
Percentage of population using internet	**USE_INT**		+
Life expectancy	**EXP**		+
Fixed broadband subscribers per 100	**FIX_SUB**		+
GDP growth rate	**GDPR**		+

In this study the countries' understudies are grouped into two groups, the first is a sample of the Gulf cooperation council countries (GCC) and the second is a sample of the Middle east and north African countries (MENA) countries as shown in table

2.

Table 2: Countries per group

Group	Countries
Group 1- GCC	**UAE, Saudi Arabia, Iran, Qatar, Oman**
Group2-MENA	**Egypt, Tunisia, Algeria, Jordan, Morocco,**

Descriptive data results

Table 3 provides the descriptive data for the variables in the MENA region from 2000 to 2020. These results show that the highest mean is the school enrollment which is 103.11 while the lowest is the GDP growth rate.

Table 3: Descriptive statistics:

	Mean	Median	Maximum	Minimum	Std. Dev.	N
SKL	103.1161	103.9811	119.5393	75.39796	8.732838	210
C_SUB	90.55483	98.75755	212.639	0.277042	52.29114	210
USE_INT	39.39505	35.36	100	0.49	30.07244	210
EXP	73.92834	73.986	80.363	67.80059	2.854739	210
FIX_SUB	4.766189	3.175798	32.81083	0	5.851259	210
GDPR	3.845448	3.626241	26.17025	-9.18237	4.340476	210

Source: Authors' calculations

Unit root test

After discussing the descriptive data, the second objective is to test the stationary of the data by depending on augmented Dickey-Fuller (ADF), and Phillips-Perron (PP).

Table 4: Unit root test for group 1

	Intercept level	Trend & intercept level	1ˢᵗ difference intercept	1ˢᵗ difference trend & intercept
SKL	ADF: 7.50079	ADF:4.25114	ADF:31.7108***	ADF:25.1790***
	PP:9.99087	PP:5.75033	PP:53.1963***	PP: 52.3558***
C_S UB	ADF: 3.12548	ADF:13.2575	ADF: 20.7626**	ADF:15.6890
	PP: 1.85399	PP:9.82394	PP:32.0966***	PP:29.3288***
USE _INT	ADF: 2.45960	ADF:9.83430	ADF: 25.4279***	ADF:20.6470**
	PP:1.61749	PP:4.80495	PP: 25.8735***	PP:19.4133**
EXP	ADF:5.35332	ADF:68.8257***	ADF: 87.8875***	ADF:87.0060***
	PP: 40.6654***	PP:12.3088	PP: 9.38096	PP: 4.12725
FIX_ SUB	ADF: 1.20174	ADF: 3.51175	ADF:19.1905**	ADF: 20.1072**
	PP: 1.20174	PP: 3.51175	PP: 41.6654***	PP: 44.3309***
GDP R	ADF: 20.7765**	ADF: 20.7829**	ADF:63.3992***	ADF: 52.4243***
	PP: 27.9276***	PP: 31.1277***	PP: 129.694***	PP: 101.830***

Source: Authors' calculations

The results show that the data are stationary at the first level I(1) in both groups. Table 4 shows that most of the variables are

significant at 1% at the first difference for group 1 while the stationary for group 2 varies from 1% to 10%.

<div align="center">Table 5: Unit root test group 2</div>

	Intercept level	Trend & intercept level	1st difference intercept	1st difference trend & intercept
SKL	ADF:8.82863	ADF:23.681***	ADF:38.8087***	ADF:26.4375***
	PP: 11.5406	PP: 18.2559*	PP: 53.9030***	PP; 32.7581***
C_SUB	ADF: 2.12595	ADF:7.14455	ADF: 12.3430	ADF:9.74276
	PP: 1.17121	PP:4.13077	PP:22.9729**	PP:19.3502**
USE_INT	ADF: 0.3424	ADF:7.6076	ADF: 14.3283	ADF:8.26243
	PP:0.14332	PP:4.41941	PP: 33.3504***	PP:27.7733***
EXP	ADF:24.7932***	ADF:101.826***	ADF: 52.1694***	ADF:59.2640***
	PP: 81.2253***	PP:3.95885	PP: 9.74210	PP: 11.6408
FIX_SUB	ADF: 0.29823	ADF: 9.73689	ADF:11.0140	ADF: 8.93200
	PP: 0.15501	PP: 2.18819	PP: 9.55396	PP: 12.6602
GDP	ADF: 24.7932***	ADF: 101.826***	ADF:52.1694***	ADF: 592640
	ADF: 3.63337	ADF:4.63393	ADF:23.6375***	ADF; 16.4000*
	PP: 12.5839	PP: 16.3294*	PP: 75.6577***	PP: 61.8630***

<div align="center">Source: Authors' calculations</div>

Correlation analysis :

By testing the cointegration between variables, most of the variables are significant at 5%. This implies the rejection of the null hypothesis that all variables are cointegrated & there is a long-run relationship

Table 6: Correlation results

t-Statistic	SKL	C_SUB	USE_INT	EXP	FIX_SUB	GDP
SKL	1					
C_SUB	-0.15804**	1				
USE_INT	0.246121***	-0.43276***	1			
EXP	0.276998***	-0.335010***	0.455865***	1		
FIX_SUB	0.248151***	-0.3802***	0.803959***	0.257724***	1	
GDPR	-0.143932**	0.391377***	-0.25711***	-0.02821	-0.25517***	1

Source: Authors' calculations

5- Results

The tested model is used to test the effect of the main characteristics of variables in panel data. These data were not observed, so a fixed effect will be beneficial in that aspect. Then table 7 shows the significance of USE_INT in group 1 at 10%, and in group 2, EXP and GDPR are significant. FIX_SUB is insignificant in group 1 compared to EXP is significant in group 2. The results showed there are no differences in each region regarding the data and there is no biased data. Also, there is a negative relation between SKL and USE_INT in group 1, but this negative relation appears in many variables in group 2 as USE_INT, FIX_SUB, and GDPR.

Table 7: Fixed effect regression results

Variable	The coefficient for the GCC countries	The coefficient for group 2- MENA countries
C	100.9990***	-24.15955
C_SUB	0.041093*	0.060214*
USE_INT	-0.123052***	-0.225982
EXP	0.006007	1.904462***
FIX_SUB	0.251246*	-1.350195
GDPR	0.278085**	-1.679729***

Source: Authors` calculations

6- Discussion

The GCC countries results show that education has a positive significant relationship to the cell subscribers per 100 persons both in the short and the long run. While education has an insignificant relation in the short run but negative and significant relation who means that the increase in population will represent pressure on the government to provide such a service – and this result is for the group of the country's overall, it may differ per group. Concerning the relationship between education and life expectancy, it represents a negative and insignificant relation in the short run but is positive and significant which reflects the positive contribution of education to the person's life. Moreover, the relationship between education and fixed broadband subscribers is negative and insignificant in the short run while it is positive and significant in the long run. These nexus reflect the positive impact of education and digitalization in the gulf countries which reveals the government's role in investing in the infrastructure which enhances education. Finally, the education & economic growth relationship presents a positive & a

significant relationship in the long run only, as a one % increase in economic growth increase education by a 5 % increase.

The results for MENA countries show that education has a positive significant relation to the cell subscribers per 100 persons both in the short and negative in the long run. While education has a negative and insignificant relation in the short run but a negative and significant relationship in the long run which means that the increase in population put pressure on the government to provide such a service – especially for that characterized by a large population and this result is for the group of the country's overall, it may differ per group.   Concerning the relationship between education and life expectancy, it represents a negative and insignificant relation in the short run but is significant which reflects that education doesn't to person's life. Moreover, the relationship between education and fixed broadband subscribers is negative and insignificant in the short run however it is negative and insignificant in the long run. This shows the limited efforts of the governments in investing in the infrastructure which hinders education. Finally, the education and economic growth relationship present a negative and insignificant relationship in the short and long run only.

Table 8:ARDL results

Variables	Group 1- GCC	Group 2- MENA
Long Run Equatio		
C_SUB	0.144295***	-0.017809
USE_INT	-0.067297***	-0.217472***
EXP	3.870593***	-2.671115***
FIX_SUB	0.336881***	-0.546119**
GDP	0.051223**	-0.940460***
Short Run Equation		
COINTEQ01	-1.185129**	-0.811614***
D(-1))	0.773743**	0.305957**
C_SUB	0.088720*	0.103120***
C_SUB(-1)	0.095063***	0.066285
USE_INT	0.479417	0.126085
USE_INT(-1)	0.441006	-0.014163
EXP	73.30384	93.07554
EXP(-1)	-48.53930	-99.40835
FIX_SUB	-0.517470	2.333068***
FIX_SUB(-1)	-0.436107	-0.154393
GDP	-0.038541	0.610989
GDP(-1)	0.170770	0.068602
C	470.5863**	-67.83374***

Source: Authors` calculations

7- Conclusion and recommendations.

These results present the importance of digitalization to reshape their economies and bring about a fundamental change in their economic structures. Therefore, GCC countries have been pushed to encourage investment to develop the creative economy and create competencies with the skills required to keep pace with the demands of the dynamic labour market.

According to the e-infrastructure index, the GCC countries outperform a very high rank in terms of individuals' use (readiness to use) digital technologies, as measured by web access, broadband, social media use...etc. The relationship between digital trade and digital infrastructure is a direct relationship, which explains the distinction between the Emirates, Qatar, Oman, Bahrain and Saudi Arabia, which distinguishes them from their counterparts in the Arab countries, and they rank much higher based on the potential of digital trade (the market) compared to the factor of digital infrastructure

Competitive Skills Index indicates the ability of countries to compete for talent. Its methodology depends on the availability of digital skills for individuals within the country, as well as the skills of graduates, the skills of the current and future workforce, and the ease of access for skilled employees. With the availability of digital networks and communications infrastructure for these cadres, the maximum benefit can be achieved from them. This interaction leads to the emergence of new institutions, professions and forms of work that also require new skills. But it also presents huge challenges in economic terms. This affects productivity, the competitiveness of production growth and employment levels. The gap between the Arab countries and the developed countries lies in the inadequacy and efficiency of the digital infrastructure and the weak links between the pillars of sustainable development. The benefits of digital transformation are reflected in increasing the efficiency of workflow and reducing errors, accelerating the daily work method, implementing new services quickly and

flexibly, improving quality and developing performance, increasing productivity and improving products, and finally increasing the satisfaction of beneficiaries.

1- It is urged to have a local invention and the rapid adoption of automation technology, especially in sectors with low labour productivity.
2- Governance of the country and the sectors targeted to attract technology investments, and development of skill-based visa acceptance systems, as well as training and education programs
3- Formulate and implement effective policies for human resource training in the Arab region, thus mitigating the impact of technology on levels of employment and inequality and enhancing employment inclusion
4- Enhancing innovative systems that promote the transition from informal to formal by setting policies and regulations that create a stable and sustainable ecosystem for the Arab digital economy.
5- Applying advanced cybersecurity measures based on protecting public information about cyber risks and measures to combat cybercrime frequently in the strategies of the Arab national digital economy

References

Ada, A. A., & Acaroğlu, H. (2014). Human Capital and Economic Growth: A Panel Data Analysis with Health and Education for MENA Region. *Advances in Management & Applied Economics, 4(4)*, 59-71. retrived on 25th of may 2022 at 9:44 pm from www.scienpress.com/journal_focus.asp?main_id=55&Sub_id=IV&Issue=1256

Adeleye, B. N., Bengana, I., Boukhelkhal, A., Shafiq, M., & Abdulkareem , H. (2022). Does Human Capital Tilt the Population-Economic Growth Dynamics? Evidence from Middle East and North African Countries. *Social Indicators Research*, 863–883. https://doi.org/10.1007/s11205-021-02867-5.

Asbury, K., Fox, L., Deniz, E., Toseeb, U., & Code, A. (2021). How is COVID-19 Affecting the Mental Health of Children with Special Educational Needs and Disabilities and Their Families? *Journal of Autism and Developmental Disorders*, 1772–1780.https://doi.org/10.1007/s10803-020-04577-2

Blanchflower, D., & Oswald, A. (2004). Well-being over time in Britain and the US. *Journal of Public Economics*, 1359 – 1386. https://doi.org/10.1016/S0047-2727(02)00168-8

Cavelaars, A., Kunst, A., Geurts, J., Crialesi, R., Grötvedt, L., Helmert, U., . . . Mielck, A. (1998). Differences in self reported morbidity by educational level: a comparison of 11 western European countries. *Journal Of Epidominal Health*, 219-227, http://dx.doi.org/10.1136/jech.52.4.219.

Chapman, D., & Miric, S. (2009). EDUCATION QUALITY IN THE MIDDLE EAST. *international review of education*, 311-344. DOI 10.1007/s11159-009-9132-5

Chaturvedi, K., Kumar-Vishwakarma, D., & Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: A survey. *Children and Youth Services Review*. https://doi.org/10.1016/j.childyouth.2020.105866

Christensen, R., & Knezek, G. (2001). Instruments for Assessing the Impact of Technology in Education, computers in Schools. *Interdisciplinary Journal of Practice, Theory, and Applied Research*, 5-25. https://doi.org/10.1300/J025v18n02_02

Cutler, D., & Lleras-Muney, A. (2006). education and health: evaluating theories and evidence. *national bureau of economic research (NBER)*. DOI 10.3386/w12352

Enders, W. (2004). *Applied Econometric Time Series*. New York,: John Wiley and sons. DOI:10.1198/tech.2004.s813

EU, E. U. (2018). *Health at Glance, State of Health in EU cycle.* retrived from Health at a Glance: Europe 2020 : State of Health in the EU Cycle | Health at a Glance: Europe | OECD iLibrary (oecd-ilibrary.org) on 26th of june 2020 at 2 pm

Fabry, D., & Higgs, J. (1997). Barriers To The Effective Use Of Technology in Education: current status. *EDUCATIONAL COMPUTING RESEARCH, Vol. 17(4)*, 385-395. https://doi.org/10.2190%2FC770-AWA1-CMQR-YTYV

Hamidi, F., Meshkat, M., Resacc, M., & Jafari, M. (2011). Information Technology in Education. *Procedia computer sciences*, 369-373. https://doi.org/10.1016/j.procs.2010.12.062

Kadiyala, M. (2000). a review of literature on effectiveness of use of information technology in education. *The research journal for engineering education*, 177-189. https://doi.org/10.1002/j.2168-9830.2000.tb00512.x

Kumar, D. (2018). Impact of modern technology in education . *Journal of Applied and Advanced Research, 2*, 33-35. https://dx.doi.org/10.21839/jaar.2018.v3S1.165

Leigh, p. (1983). Direct and indirect effects of Education on health. *Social Science and Medicine*, 227-234. https://doi.org/10.1016/0277-9536(83)90120-X

Leonardi, P. M. (2011). When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies. *MIS quartely*, 146-167, https://doi.org/10.2307/23043493.

Mackenbach, J., Stirbu, I., Roskam, A.-J., Schaap, M., Menvielle, G., kunst, A., & Leinsalu, M. (2008). Socioeconomic Inequalities in Health in 22 European Countries. *The New England Journal of Medicine*, 2468-2481. DOI: 10.1056/NEJMsa0707519

Mckenbach, J., Kulhánová, I., Borell, C., Artnik, B., dibben, C., & Clemens, T. (2016). Changes in mortality inequalities over two decades: register based study of European countries. *BMJ*. https://doi.org/10.1136/bmj.i1732

Mirowsky, J., & Ross, C. (2007). *Education, Social Status, and Health.* New york: Francais & Taylor. https://doi.org/10.4324/9781351328081

Ng, W. (2015). *New Digital Technology in Education.* Springer. DOI 10.1007/978-3-319-05822-1

Njoh, A. (2018). The relationship between modern Information and Communications Technologies (ICTs) and development in Africa. *Utilities policy*, 83-90, https://doi.org/10.1016/j.jup.2017.10.005.

OECD, (2018). *Health at Glance, State of Health in EU cycle.*m https://doi.org/10.1093/eurpub/ckz203

Ogundari, K., & Awokuse, T. (2018). Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than education? *Economic Analysis and policy*, 131-140, https://doi.org/10.1016/j.eap.2018.02.001.

Ogundari, K., & Awokuse, T. (2018). Human capital contribution to economic growth in Sub-Saharan Africa: Does health status matter more than Education? *Economic Analysis and Policy*, 131-140, https://doi.org/10.1016/j.eap.2018.02.001.

Parez, K., Sanchez-Ledesma, E., Bartoll, X., & Rodraguez-Sanz, M. (2022). *Inequalities in life expectancy by educational level and its decomposition in Barcelona 2004-2018.* Gaceta Sanitaria, https://doi.org/10.1016/j.gaceta.2021.11.008

Palvia, P., Baqirb, N., & Nematia, H. (2018). ICT for socio-economic development: A citizens`perspective. *Information & Management*, 160-176, https://doi.org/10.1016/j.im.2017.05.003.

Ross, C., & Wu, C.-l. (1995). The Links Between education and health. *American Sociological Association*, 719-745. https://doi.org/10.2307/2096319

Salman, D., Rashdan, A., & Amr, L. (2020). Egyptian female entrepreneurship as driving factors in the digital era, a hope or a challenge. *Economics & Law*, *2*(2), 33-49. DOI: 10.37708/el.swu.v2i2.4

Salman, D. M. (2016). What is the role of public policies to robust international entrepreneurial activities on economic growth? Evidence from cross countries study. *Future Business Journal*, *2*(1), 1-14. https://doi.org/10.1016/j.fbj.2016.02.001

Schultz, T. (1981). *Investing in people: The economics of USE_INTulation quality.* Los Anglos: University of California Press.retrived on 25th of may 2022 at 1:19 am at www.jstor.org/stable/1085271?casa_token=lZtNqYmmwpgAAAAA %3AhcRyWSVHsFecOodSjumxIhN8511DA_J38Tw0zw_74H4Vbn 0I0lHP7OPiuV_Rf5sFoGINF69pqNjcbKeDL5UtiqGen1Z5C35FUjR ko5T5O8gwLs9H099QaA&seq=3

Soliman, C., & Salman, D. A. (2022). The Role of Egyptian Higher Education in the Development of Digital Entrepreneurship: Evidence from Private Universities. *Economics & Law*, *4*(1), 101–119. https://doi.org/10.37708/el.swu.v4i1.8

Silventoinen, K., & Lahelma, E. (2002). Health inequalities by education and age in four Nordic countries, 1986 and 1994. *Journal of Epidemiology and Community Health 56(4)*, 253-258, DOI: 10.1136/jech.56.4.253

Solow, R. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics, 70(1)*, 65-94, doi:10.2307/1884513 .

Sweetland, S. (1996). Human Capital Theory: Foundations of a Field of Inquiry. *Review of Educational Researc*, 341-359. https://doi.org/10.2307/1170527

Tiwari, A. K., & Mutascu, M. (2011). Economic growth and FDI in Asia: A panel-data approach. *Economic Analysis and Policy*, 173-187, https://doi.org/10.1016/S0313-5926(11)50018-9.

Welmond, M. (2006). *The Road Not Travelled: Education Reform in The Middle East.* World Bank. retrived fom [The Road Not Traveled : Education Reform in the Middle East and North Africa (worldbank.org)](worldbank.org) on 25th of june at 2 pm

Williams, D., & Chiquita , C. (1995). US Socioeconomic and Racial Differences in Health: Patterns and Explanations. *Annual Review of Sociology. 349-386,* https://www.jstor.org/stable/2083415