

Educational Trajectories within the Cluster of E-Commerce at the EU Level

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Abstract

The COVID-19 health crisis determined the digital transformation that hybridizes in different shapes and intensities the activities; for example, e-commerce flourished in the last 18 months. Technological change generates "radically new" jobs, and they are demanding new skills. E-commerce moves in the digital the sales, payment, and orders. The high level of interdisciplinarity of e-commerce melts old commerce with information technologies skills. It creates "new markets, new products, new business models, service innovation for products, customer-centric innovation". (De Propris & Bailey, 2020) While technological progress is faster and faster, occupational mobility is the solution for the resilience of the labor force. Labor market and education systems need to identify, define, standardize and manage new skills and competencies to respond to e-commerce's demands. The paper aims to identify educational trajectories by ISCED level and fields within the cluster of e-commerce using the Spearman correlation. We explore the monotonic relationship between the pairs data of the share of graduates by education (15 areas and five levels of education for the 2013-2018 period) and e-commerce share of enterprises' turnover for the period 2015-2020 by ranks estimation for 27 European countries. The findings were on two dimensions: one pointed specifically toward e-commerce and the other pointing to the general change in the digital transformation through the radical shift in education. The first result shapes the e-commerce cluster profile that maps the "Computer use" covering the entire educational trajectory from ISCED 5 to ISCED 8. The fields "Secretarial and office work" and "Wholesale and retail sales" supplement the cluster but only at ISCED 6 level.

Keywords

Education; training; digitalization; e-commerce; graduates; employability

Introduction

Recently, especially due to the background of the COVID-19 pandemic, e-commerce emerges as distinct sector. The EU 27 share of enterprises' turnover on e-commerce

sales increased in 2020 to 20% from 17% in 2018, with a growth rate of 17.6%. Looking back ten years, this share almost doubled from 12% in 2009. A lot of new technologies coming from ITC sector hybridize the commerce; e-commerce being an example of digital transformation appearance in business and jobs.

E-commerce is to account for Half the Growth in Global Retail by 2025 according to Euromonitor International (Li, 2021). Amazon & eBay are among the biggest online market places that have in 2019 over 50% for all e-commerce (Foot, 2020). So, the e-commerce is a good example of **digital transformation** "as the process of replacing the traditional business process with digital technologies, to improve, advance or streamline ways of working" (airfocus, 2021). Through digital experience the customer fulfils its personalized experiences in a safer, quickly and efficiently manner.

The digital channel is not only for sales but for research (McAuliffe, 2020) that cover whole globe using online marketplaces (Foot, 2020). On the other side, the seller anticipate that customer needs and its strategy of "e-Commerce customer experience is rapidly becoming the great differentiator" (McAuliffe, 2020). Eurostat defines e-commerce as "sales of goods or services, the order is placed via web sites, apps or EDI¹-type messages by methods specifically designed for the purpose of receiving orders", excluding the orders written in e-mail. Payment may be done online or offline.

High potential of growth and the increased capacity of employment are the main characteristics of e-commerce to be of interest for topics as: Design centered on employer/demand; Horizontal occupational mobility on the background of Educational and Vocational Systems; Digital single market; Digital transformation; Resilience.

On this background our **research question** is: *What are the detailed fields of education and training by education levels correlated with e-commerce increasing?*

Technological progress changes the personal, civic, social and employment-related context. Consequently, the new demand for improving knowledge, skills, and competencies related to e-commerce development needs to radically update or change the occupations and content of requested skills. The new skills demanded by e-commerce has to be identified, defined and operationalized in the education framework in terms of field and level of education.

Our research is a small part of the challenge raised by the profound digital transformation process across all fields of human activity that generates radical structural changes of the economy towards Industry 4.0+ (De Propris & Bailey, 2020). These radical changes are critical issues for human capital management at any age and in all sectors. Clustering the educational trajectories for any education (initial or adult education) is a base for increasing occupational mobility to support intersectoral and intra-sectoral labor force reallocation (Hamiton, 2012). "Occupational clusters have the potential to facilitate skills transferability and cross-occupational mobility. These clusters contain certain elements, such as skills, knowledge, tasks, activities and

¹ Electronic Data Interchange

desirable employee attributes, which are common to 'groups' of occupations across industries" (Snell et al., 2016, p. 10).

E-commerce skills are digital work skills. As a digital work is geographically disconnected and cover worldwide in a **global gig economy** named also as the **planetary labor market** by Graham & Amir Anwar (2019). Even if the digital transformation "affects everyone to some extent" (Larsson & Teigland, 2020) we focus on e-commerce cluster skills only for the purpose of labor market transparency.

Research methodology

The levels of education and fields of education are two main cross-classification variables provided by the International Standard Classification of Education (ISCED, 2011) belonging to the United Nations International Family of Economic and Social Classifications, so ISCED is the global "reference classification for organizing educational programs and related qualifications by education levels and fields" (UNESCO Institute for Statistics, 2012, p. 6).

We build 120 variables detailed in the Matrix of education as a result of composing the field component of 15 fields (Table 2) and the education level component (Table 3). We will consider the education matrix reduced at two dimensions: field and level of education.

UNESCO Institute of Statistics (2014) defines the fields of education and training and the one related to the e-commerce definition and activity. Starting from previous selections (Dima, Maassen, & Mehmanpazir, 2020; Dima & Maassen, 2018; Gellweiler, 2020) we built a list of 14 fields (see Table 1). The fields are described by main characteristics: broad field, narrow field and detailed field, our interest being focused on the detailed field.

Table 1. E-commerce fields of education and training selection

Broad field	Narrow field	Detailed field
04 Business, administration and law	041 Business and administration	0411 Accounting and taxation
		0412 Finance, banking and insurance
		0413 Management and administration
		0414 Marketing and advertising
		0415 Secretarial and office work
		0416 Wholesale and retail sales
		0417 Work skills
05 Natural sciences, mathematics and statistics	054 Mathematics and statistics	0541 Mathematics
		0542 Statistics
06 Information and Communication	<i>061 Information and</i>	<i>0610 Information and Communication Technologies not further defined</i>

Technologies (ICTs)	Communication Technologies (ICTs)	0611 Computer use
		0612 Database and network design and administration
		0613 Software and applications development and analysis
07 Engineering, manufacturing and construction	071 Engineering and engineering trades	0714 Electronics and automation

UNESCO Institute for Statistics, 2014

The data used as the first set of variables for the model are the share of graduates by the field of education in the fields compatible with e-commerce, the indicator educ_uae_grad03 from Eurostat with the structure detailed in the Table2.

Table 2. E-commerce field of education and training variables component (Eurostat - Distribution of graduates at education level and program orientation by sex and field of education [educ_uae_grad03])

No	Variable Code	ISCED F-13	Share
1	F0411	Accounting and taxation	X ₁
2	F0412	Finance, banking and insurance	X ₂
3	F0413	Management and administration	X ₃
4	F0414	Marketing and advertising	X ₄
5	F0415	Secretarial and office work	X ₅
6	F0416	Wholesale and retail sales	X ₆
7	F0417	Work skills	X ₇
8	F0541	Mathematics	X ₈
9	F0542	Statistics	X ₉
10	F0610	Information and Communication Technologies not further defined	X ₁₀
11	F0611	Computer use	X ₁₁
12	F0612	Database and network design and administration	X ₁₂
13	F0613	Software and applications development and analysis	X ₁₃
14	F0619	Information and Communication Technologies not elsewhere classified	X ₁₄
15	F0714	Electronics and automation	X ₁₅
	$x = \sum_{i=1}^n x_i$	Total	100

Note: codified as F [UNESCO ISCED F -2013] at 4 digits

According to the definitions of ISCED for an educational program, it has to be a coherent set of activities meant to achieve the pre-determined objectives. The participants in an education or training program will gain competencies (knowledge, skills) to make them employable after completion is certified by graduation in the

specific field of activity. The level of education for the graduates reflects through certification the successful completion of the learning objectives or educational tasks. Graduates march the new skill demand for e-commerce after whole two years of entering the labor market in the new jobs created by e-commerce. For the correlation model, the level of education variable component uses the Table 3 codification for the Level of Education ISCED 2011 classification.

Table 3. The ISCED 11 levels of education (Eurostat) variables component

Code	Level of Education ISCED 2011 classification
ED35	Upper secondary education - vocational
ED45	Post-secondary non-tertiary education - vocational
ED5-8	Tertiary education (levels 5-8)
ED5	Short-cycle tertiary education
ED544	Short-cycle tertiary education - general/academic, sufficient for level completion
ED6	Bachelor's or equivalent level
ED7	Master's or equivalent level
ED8	Doctoral or equivalent level

Note codified as E_[levelISCED]

The model we are developed considered the share of graduates by the level of education during 2015-2018 in European countries. The graduates' s structure dynamics by the level of education and year of study across the EU27 and other countries is in Appendix 1. The period 2015-2018 reflects the tendency of increasing the shares of higher levels of education for the Eu27 countries and five other European countries (Iceland, Liechtenstein, Norway, Switzerland and the United Kingdom).

The main changes that are confirming the trend to higher-skilled labor for the 32 countries are:

- *Positive changes:*
 - Short-cycle tertiary education (ISCED 5) increase is of 3.75pp from 14.61% average share in 2015 to 18.37% in 2018;
 - Master's or equivalent level (ISCED 7) increase is of 3.25pp from 19.45% average share in 2015 to 22.7% in 2018;
 - Tertiary education (ISCED 5-8) increase is of 2.61pp from 17.19% average share in 2015 to 19.80% in 2018;
 - Bachelor's or equivalent level (ISCED 6) increase is of 1.61pp from 18.69% average share in 2015 to 20.30% in 2018;
 - Doctoral or equivalent level (ISCED 8) increase is of 0.66pp from 8.84% average share in 2015 to 9.6% in 2018;
- *Negative changes:*
 - Post-secondary non-tertiary education - vocational (ISCED 4-5) decrease is of 3.01pp from 18.18% average share in 2015 to 15.17% in 2018;
 - Upper secondary education - vocational (ISCED 3-5) decrease is of 1.22pp from 18.18% average share in 2015 to 16.96% in 2018.

Recently, Eurostat develop a specific methodology for the measurement of e-commerce in the survey on ICT and e-commerce usage in enterprises (Kaminska,

2019). In our opinion the e-commerce increasing importance is visible through the share of the enterprises' turnover on e-commerce (Table 4).

Table 4. Share of enterprises' turnover on e-commerce [ptec]

TIME	2015	2016	2017	2018	2019	2020
Ireland	37	35	33	35	34	44
Belgium	25	29	31	32	33	31
Czech Republic	30	31	31	29	32	30
Denmark	20	23	23	23	25	29
Sweden	19	21	19	24	25	24
Finland	21	20*	21	21	23	24*
France	17	17	19	22	22	23
Hungary	19	16	20	23	24	23
Slovakia	21	18	22	21	21	21
United Kingdom	20	19	18	19	21	21
Portugal	17	14	16	18	19	20
Spain	14	16	16	17	17	19
Norway	20	24	21	25	26	19
Germany	17	14	21	14	15	18
Slovenia	13	15	16	17	17	18
Netherlands	13	14	15	15	15	17
Austria	16	15	14	14	14	17
Poland	13	14	15	15	18	17
Estonia	13	15	16	15	14	14
Croatia	14	14	11	12	12	14
Lithuania	10	11	13	13	13	14
Italy	9	9	10	11	12	13
Romania	8	7	8	9	7	12
Latvia	7	7	9	6	7	10
Bulgaria	5	4	5	5	4	6
Cyprus	6	4	5	4	5	6
Greece	2	6	4	4	4	4

Note: (*) Musings replaced by trend values for the period 2009-2020
All enterprises, without financial sector, 10 persons employed or more
Eurostat

In the last 5 years, for 22 countries from the 27 European countries presented in the Table 4 the share of enterprises' turnover on e-commerce increase was with 3pp from 16% in 2015 at 19% in 2020. The best performer countries had high level of this share Ireland (44%), Belgium (31%), Czech Republic (30%) and Denmark (29 %), but in regard to high levels of the change of the share of enterprises' turnover on e-commerce the highest were recorded by Denmark (+9pp), Ireland (+7pp), Belgium (+6pp) and France (+6pp).

Correlations Matrix Model

To answer to the research question, we have to study a potential correlation between the education level and the e-commerce share. The statistical correlation between two variables indicates the existence of linear relationships (X and Y) in the case of Pearson

correlation. This link is called the correlation coefficient and can be described by the characteristics: direction, degree of association and shape. The direction could be positive (high values of X are associated with high values of Y) or negative (High values of X are associated with small values of Y) and the degree of association can take values between -1 and 1.

The Pearson correlation (r) represents "Statistical technique that measures and describes the degree of linear association between two normally distributed continuous quantitative variables" (Bolboacă, 2012). That is why a normality check is mandatory. We applied the Shapiro-Wilk W and the Kolmogorov-Smirnov one-sample test for normality. The Shapiro-Wilk W test states that if the W statistic is significant the normal distribution hypothesis has to be rejected. It is used on a large scale due to his good results compared with other tests (Shapiro, Wilk, & Chen, 1968). The second test Kolmogorov-Smirnov of normality compared with the Shapiro is considering the two variables as being part of one sample testing the "goodness of fit" of the data (Berger & Zhou, 2014).

The results of the normality tests Kolmogorov-Smirnov and Shapiro Wilk indicate that all educational variables reject the normality test. The W statistic is significant for all educational variables (level and field), therefore the hypothesis that the respective distribution is normal should be rejected. Since the normality test was rejected, we had to consider a nonparametric test for correlation (Spearman Rank Order Correlation, Gamma Correlations and Kendall Tau) should be checked.

We apply the Spearman test while there is no requirement of normality and for linearity. This test could be applied for any type of variable while the assumptions are respected: to be "interval or ratio level or ordinal and monotonically related" (statstutor.ac.uk) or, in other words the relationship among the two pairs of variables has a "direction" (Bishara & Hittner, 2012).

According to Bolboacă (2012) the Spearman correlation coefficient is different than Pearson correlation: if Spearman correlation=1 then Pearson correlation =0,88. This property makes Spearman correlation weaker than Pearson correlation, covering (~90%).

There are two methods to calculate Spearman's correlation depending on whether: (1) your data does not have tied ranks or (2) your data has tied ranks.

The Spearman correlation equations are:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \quad (1)$$

when there are no tied ranks;

where d_i = difference in paired ranks and n = number of cases.

The formula to use when there are tied ranks is:

$$\rho = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2 \sum_i (y_i - \bar{y})^2}} \quad (2)$$

where i = paired score.

Our model explores the monotonic relationship between the pairs data of education (field and level) and e-commerce ranks, Spearman ($x_{i,j,t-2,z}$; Y_{tz}) where:

x_i see the Matrix education (field and level) from the Table 5

Y = Share of enterprises' turnover on e-commerce - % in years

z = 30 total number of countries analyzed

$t=6$ years = 2015, 2016, 2017, 2018, 2019, 2020 from Eurostat
[TIN00110\$DEFAULTVIEW]

$t-2=6$ years =2013, 2014, 2015, 2016, 2017, 2018 from Eurostat
[educ_uoe_grad03]

i = 15 fields of education

j = 4 level of education

The correlation was calculated with STATISTICA 10 software.

Results

The Spearman ranks coefficients for education (by field and level) with e-commerce across Europe is presented in Table 5. Among the 60 pairs of variables there are 25 significant at 5%. We can say for the 25 Spearman coefficients, marked in red, that there is less than a 5% chance that the strength of the relationship happened by chance if the null hypothesis were true: H_0 : There is no [monotonic] association between education (field and level) and e-commerce shares.

Table 5. The Spearman ranks coefficients for education by field and level with e-commerce across Europe (Calculated by authors)

ISCED 11 ISCED F- 13	Short-cycle tertiary education	Bachelor's or equivalent level	Master's or equivalent level	Doctoral or equivalent level
	ISCED 5	ISCED 6	ISCED 7	ISCED 8
F0411	-0.072240	-0.402636	-0.125356	-0.162206
F0412	0.115406	-0.241877	-0.264170	-0.190615
F0413	-0.210192	-0.300722	-0.341203	-0.378780
F0414	-0.022684	-0.113347	0.023281	-0.158510
F0415	-0.219399	0.179990	-0.171789	
F0416	0.084474	0.167955	-0.112220	-0.072902
F0417	0.247875	-0.126091	-0.137178	0.012691
F0541	0.179516	-0.335244	-0.096544	-0.097606
F0542	0.082464	-0.225551	0.154576	0.137099
F0610	-0.012533	0.015873	-0.016719	0.016812
F0611	0.379329	0.172595	0.022741	0.221721
F0612	-0.011561	-0.212873	-0.208187	-0.158134
F0613	-0.124784	-0.206360	-0.180249	-0.237860

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F0619	0.003873	0.019595	0.070911	-0.002860
F0714	-0.129210	-0.319435	-0.100530	-0.262369

- Legend:**
- negative direction of correlation
 - positive direction of correlation
 - 0.00-0.19 “very weak” strenght of correlation
 - 0.20-0.39 “weak” strenght of correlation
 - 0.40-0.59 “moderate” strenght of correlation

The strength of Spearman correlation is strongly differentiated by the level of education. They are:

- 6 positive relationships from which 3 *very weak* and 3 *weak*;
- 19 negative relationships from which 1 *moderate*, 15 *weak* and 3 *very weak*.

For **ISCED 6, bachelor degree**, there are 11 significant relationships from which: 8 negative and 3 positive relationships:

- The graduates share during the period 2013-2018 from F0411 Accounting and taxation at ISCED 6 level the higher rank in graduation the lower rank in e-commerce, have a *moderate negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020;
- The graduates share during the period 2013-2018 from
 - F0412 Finance, banking and insurance
 - F0413 Management and administration
 - F0541 Mathematics
 - F0542 Statistics
 - F0612 Database and network design and administration
 - F0613 Software and applications development and analysis
 - F0714 Electronics and automation

have a *weak negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020;

- The graduates share during the period 2013-2018 from
 - F0415 Secretarial and office work
 - F0416 Wholesale and retail sales
 - F0611 Computer use

have a *very weak positive relationship* in the last 5 years of e-commerce, respectively in 2015-2020.

For **ISCED 7, master degree**, there are 5 significant relationships all of them negative:

- The graduates share during the period 2013-2018 from
 - F0412 Finance, banking and insurance
 - F0413 Management and administration
 - F0612 Database and network design and administration

have a *weak negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020;

- The graduates share during the period 2013-2018 from
 - F0415 Secretarial and office work at ISCED 7 level
 - F0613 Software and applications development and analysis

the higher rank in graduation the lower rank in e-commerce, have a *very weak negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020.

For **ISCED 8, doctoral degree**, there are 5 significant relationships from which: 4 negative and 1 positive relationships:

- The graduates share during the period 2013-2018 from
 - F0413 Management and administration
 - F0613 Software and applications development and analysis
 - F0714 Electronics and automation

have a *weak negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020;

- The graduates share during the period 2013-2018 from F0412 Finance, banking and insurance at ISCED 8 level the higher rank in graduation the lower rank in e-commerce, have a *very weak negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020;

- The graduates share during the period 2013-2018 from
 - F0611 Computer use

have a *weak positive relationship* in the last 5 years of e-commerce, respectively in 2015-2020.

For **ISCED 5, Short term tertiary education**, are 4 significant relationships from which: 2 negative and 2 positive relationships:

- The graduates share during the period 2013-2018 from
 - F0413 Management and administration
 - F0415 Secretarial and office work

have a *weak negative relationship* in the last 5 years of e-commerce, respectively in 2015-2020;

- The graduates share during the period 2013-2018 from
 - F0417 Work skills
 - F0611 Computer use

have a *weak positive relationship* in the last 5 years of e-commerce, respectively in 2015-2020.

Table 6. The correlation Matrix of Education by fields and levels with e-commerce across Europe (Calculated by authors)

E5_F0411	E6_F0411	E7_F0411	E8_F0411
E5_F0412	E6_F0412	E7_F0412	E8_F0412
E5_F0413	E6_F0413	E7_F0413	E8_F0413
E5_F0414	E6_F0414	E7_F0414	E8_F0414
E5_F0415	E6_F0415	E7_F0415	E8_F0415
E5_F0416	E6_F0416	E7_F0416	E8_F0416
E5_F0417	E6_F0417	E7_F0417	E8_F0417
E5_F0541	E6_F0541	E7_F0541	E8_F0541
E5_F0542	E6_F0542	E7_F0542	E8_F0542
E5_F0610	E6_F0610	E7_F0610	E8_F0610
E5_F0611	E6_F0611	E7_F0611	E8_F0611
E5_F0612	E6_F0612	E7_F0612	E8_F0612
E5_F0613	E6_F0613	E7_F0613	E8_F0613
E5_F0619	E6_F0619	E7_F0619	E8_F0619
E5_F0714	E6_F0714	E7_F0714	E8_F0714

Legend:

E5_F0000 negative moderate

E5_F0000 negative weak

E5_F0000 negative very weak

E5_F0000 positive weak

E5_F0000 positive very weak

The correlations matrix shows that only some fields of education from the expected are related with the e-commerce evolution.

I. *Relatively weak positive relationship with e-commerce* – we appreciate this fact as the indicator for the presence of the tendency of increasing the demand by e-commerce for: Weak intensity F0611 Computer use for ISCED 5, 6 and 8 and with very weak intensity for the ISCED 6; Weak intensity for F0417 Work skills for ISCED 5 and Very weak intensity for F0415 Secretarial and office work and F0416 Wholesale and retail sales for ISECD 6.

II. *Relatively weak negative relationship with e-commerce* – this reflects the tendency of decreasing the demand by e-commerce for: Moderate intensity F0411 Accounting and taxation at ISCED 6 level; Weak intensity F0413 Management and administration regardless the ISCED level; Weak intensity F0412 Finance, banking and insurance and F0613 Software and applications development and analysis for the ISCED 6, 7 and 8 weak intensity for F0415 Secretarial and office work ISCED 5 and 7, F0612 Database and network design and administration ISCED 6 and 7 and F0714 Electronics and automation ISCED 6 and 8.

III. *No relationship with e-commerce* regardless the level for F0414 Marketing and advertising; F0610 Information and Communication Technologies not further defined; F0619 Information and Communication Technologies not elsewhere classified.

Conclusions

The F0611 Computer use, regardless the ISCED level of education (even if ISCED 7 is an exception) has a positive relationship with e-commerce. The highest share of graduates for e-commerce looks to have the ISCED 6 level of education with certification in the fields F0415 Secretarial and office work and F0416 Wholesale and retail sales. For these sectors the graduates present occupation mobility higher propensity in the cluster of e-commerce. It looks that the F0611 Computer use field cover the full educational trajectory for all educational levels from ISCED 5 to ISCED 8. We appreciate that the absence of the strong and very strong correlation between the graduates share and the e-commerce field could be question mark of the compatibility of the programs with the emerging activities. Nevertheless, our analysis is giving a hint of the need of educational programs related with the e-commerce (on a growing trend) like F0611 Computer use, F0415 Secretarial and office work, F0416 Wholesale and retail sale and 0417 Work skills.

At the same time the positive correlations highlighted the growing trends for ISCED 5 and 6 and 8 for F0611 Computer use. The first two are addressing the needs of use the technology, since the positive correlation for F0611 Computer use ISCED 8 address the high skilled need in developing products for e-commerce (on-line shops, orders, tracking delivery, payment etc.)

While the progress of technology increases exponentially, the learning rate of human capital is left behind. The new paradigm of learning in the digital transformation perspective changes its weight center from the creation of technology towards the use of technology. Digital transformation is possible when technology is the primary tool to create new technology.

E-commerce demand skills design needs at least two innovative dimensions to develop: the **digital transformation core skills** and the **global gig economy**. The “digital transformation requires the organization to deal better with change overall, essentially making change a core competency as the enterprise becomes customer-driven end-to-end.” (Bloomberg, 2018) e-commerce occupation belongs to the digital planetary labor market and its skills have a global occupational mobility. The process to define and create e-commerce skills is **an iterative process** (Larsson & Teigland, 2020)



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Appendix 2

Spearman Rank Order Correlations (ISCED5).MD pairwise deleted. Marked correlations are significant at p <.05000 (Calculated by authors)

	Valid	Spearman	t(N-2)	p-value
ptec & E5_F0411	110	-0.072240	-0.75271	0.453265
ptec & E5_F0412	110	0.115406	1.20741	0.229913
ptec & E5_F0413	110	-0.210192	-2.23429	0.027523
ptec & E5_F0414	110	-0.022684	-0.23580	0.814036
ptec & E5_F0415	110	-0.219399	-2.33701	0.021283
ptec & E5_F0416	110	0.084474	0.88103	0.380260
ptec & E5_F0417	110	0.247875	2.65897	0.009030
ptec & E5_F0541	110	0.179516	1.89640	0.060580
ptec & E5_F0542	110	0.082464	0.85991	0.391741
ptec & E5_F0610	110	-0.012533	-0.13025	0.896607
ptec & E5_F0611	110	0.379329	4.26053	0.000044
ptec & E5_F0612	110	-0.011561	-0.12015	0.904589
ptec & E5_F0613	110	-0.124784	-1.30701	0.193985
ptec & E5_F0619	110	0.003873	0.04025	0.967970
ptec & E5_F0714	110	-0.129210	-1.35414	0.178518

Spearman Rank Order Correlations (ISCED 6). MD pairwise deleted. Marked correlations are significant at p <.05000 (Calculated by authors)

	Valid	Spearman	t(N-2)	p-value
ptec & E6_F0411	154	-0.402636	-5.42303	0.000000
ptec & E6_F0412	154	-0.241877	-3.07331	0.002510
ptec & E6_F0413	154	-0.300722	-3.88750	0.000151
ptec & E6_F0414	154	-0.113347	-1.40650	0.161616
ptec & E6_F0415	154	0.179990	2.25590	0.025504
ptec & E6_F0416	154	0.167955	2.10052	0.037334
ptec & E6_F0417	154	-0.126091	-1.56706	0.119180
ptec & E6_F0541	154	-0.335244	-4.38703	0.000021
ptec & E6_F0542	154	-0.225551	-2.85433	0.004915
ptec & E6_F0610	154	0.015873	0.19572	0.845093
ptec & E6_F0611	154	0.172595	2.16032	0.032315
ptec & E6_F0612	154	-0.212873	-2.68604	0.008035
ptec & E6_F0613	154	-0.206360	-2.60014	0.010238
ptec & E6_F0619	154	0.019595	0.24163	0.809392
ptec & E6_F0714	154	-0.319435	-4.15601	0.000054

**Spearman Rank Order Correlations (ISCED7) MD pairwise deleted.
Marked correlations are significant at $p < .05000$ (Calculated by authors)**

	Valid	Spearman	t(N-2)	p-value
ptec & E7_F0411	154	-0.125356	-1.55778	0.121366
ptec & E7_F0412	154	-0.264170	-3.37687	0.000931
ptec & E7_F0413	154	-0.341203	-4.47519	0.000015
ptec & E7_F0414	154	0.023281	0.28711	0.774421
ptec & E7_F0415	154	-0.171789	-2.14992	0.033143
ptec & E7_F0416	154	-0.112220	-1.39233	0.165856
ptec & E7_F0417	154	-0.137178	-1.70738	0.089793
ptec & E7_F0541	154	-0.096544	-1.19587	0.233611
ptec & E7_F0542	154	0.154576	1.92892	0.055604
ptec & E7_F0610	154	-0.016719	-0.20615	0.836948
ptec & E7_F0611	154	0.022741	0.28044	0.779521
ptec & E7_F0612	154	-0.208187	-2.62420	0.009572
ptec & E7_F0613	154	-0.180249	-2.25926	0.025289
ptec & E7_F0619	154	0.070911	0.87645	0.382166
ptec & E7_F0714	154	-0.100530	-1.24573	0.214779

Correlations (ISCED5) Marked in red correlations are significant at $p < .05000$ (Calculated by authors)

	Valid	Spearman	t(N-2)	p-value
ptec & E8_F0411	134	-0.162206	-1.88861	0.061138
ptec & E8_F0412	134	-0.190615	-2.23091	0.027375
ptec & E8_F0413	134	-0.378780	-4.70223	0.000006
ptec & E8_F0414	134	-0.158510	-1.84446	0.067358
ptec & E8_F0415	134			
ptec & E8_F0416	134	-0.072902	-0.83981	0.402533
ptec & E8_F0417	134	0.012691	0.14582	0.884289
ptec & E8_F0541	134	-0.097606	-1.12679	0.261875
ptec & E8_F0542	134	0.137099	1.59016	0.114190
ptec & E8_F0610	134	0.016812	0.19318	0.847115
ptec & E8_F0611	134	0.221721	2.61240	0.010033
ptec & E8_F0612	134	-0.158134	-1.83997	0.068019
ptec & E8_F0613	134	-0.237860	-2.81356	0.005649
ptec & E8_F0619	134	-0.002860	-0.03286	0.973838
ptec & E8_F0714	134	-0.262369	-3.12383	0.002195